DOCUMENT RESUME

ED 415 848 IR 018 705

AUTHOR	Peretz, Blossom A.
TITLE	Before 2000: Funding Technology in New Jersey's Schools and Public Libraries by the End of the Century.
INSTITUTION	New Jersey State Div. of the Ratepayer Advocate, Newark.; New Jersey Library Association.; New Jersey State Dept. of Education, Trenton.
PUB DATE	1997-09-09
NOTE	113p.
PUB TYPE	Reports - Evaluative (142)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	Distance Education; Elementary Secondary Education; Internet; *Library Automation; Library Development; *Library Funding; Program Costs; *Public Libraries; *Public Schools; State Federal Aid; Technological Literacy; Telecommunications
IDENTIFIERS	Access to Services; New Jersey Library Association; *Telecommunications Act 1996

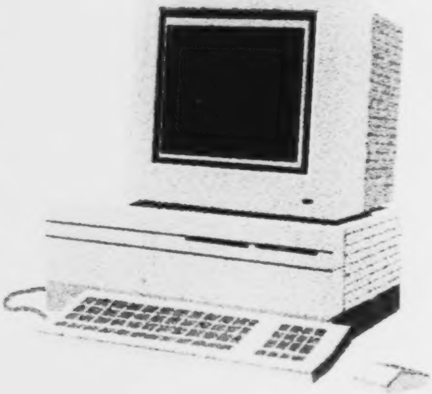
ABSTRACT

This report proposes establishing sufficient technological capability within New Jersey's K-12 classrooms and public libraries in response to the universal service mandate of the Federal Telecommunications Act of 1996. Sections cover: (1) Goals; (2) Networked Education and Life-Long Learning Model for New Jersey Schools and Libraries, Technology for New Jersey Schools and Libraries, Effective Use of Technology; (3) Educational Networking for New Jersey: the Costs, Public School Costs, Library Costs; (4) Funding Options for New Jersey, State Technology Funding Approaches, Overview of Tax-Exempt Leasing as a School Funding Source, Discounts for Schools and Libraries: an Overview of Federal and State Regulatory Proceedings Regarding Universal Service, Additional Funding Options for New Jersey; (5) Cost Reduction Opportunities; and (6) Some Immediate Steps to be Taken. A detailed 5-year cost model proposes to provide access to the Internet and other multi-media products to enhance distance learning and telecommunications. Identified are over 30 cost-reducing initiatives saving $250 million. The Ratepayer Advocate's Universal Service proposal filed with the Board of Public Utilities is also summarized. Appendices include: (1) Assumptions; (2) Educational Telecommunications Online in New Jersey; (3) School and Library Cost Data; (4) Revenue and Cost Reduction Initiatives; (5) Educational Technology Funding for K-12 Schools--Sources of Funding for Educational Technology, State by State; (6) Telecommunications Act of 1996 (Excerpted); (7) Brief on Behalf of the Division of the Ratepayer Advocate on Universal Service Issues (Excerpted); (8) Sources of Federal Technology Funds; and (9) Sources of Further Information. (Contains 106 references.) (JAK)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 415 848

Before 2000:
Funding Technology in New Jersey's Schools and Public Libraries By the End of the Century



Blossom A. Peretz, Esq. , Ratepayer Advocate
Division of the Ratepayer Advocate
State of New Jersey
31 Clinton Street, 11th Floor
P.O. Box 46005
Newark, New Jersey 07101

BEST COPY AVAILABLE

(Revised 9/9/97)

"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY
Leora Mosston

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
☐ This document has been reproduced as received from the person or organization originating it
☐ Minor changes have been made to improve reproduction quality
- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

IR018705

TABLE OF CONTENTS

PAGE

EXECUTIVE SUMMARY 2

INTRODUCTION 6

I. Goals 8

II. A Networked Education and Life-Long Learning Model for New Jersey Schools and Libraries 10

A. Technology for New Jersey Schools & Libraries 10

B. Effective Use of Technology 13

III. Educational Networking for New Jersey: The Costs 18

A. Public School Costs 19

B. Library Costs 21

IV. Funding Options for New Jersey 23

A. State Technology Funding Approaches 23

B. An Overview of Tax-Exempt Leasing as a School Funding Source 26

C. Discounts for Schools and Libraries: An Overview of Federal and State Regulatory Proceedings Regarding Universal Service 27

D. Additional Funding Options for New Jersey 30

V. Cost Reduction Opportunities 31

VI. Some Immediate Steps to Be Taken 33

CONCLUSION 36

TABLE OF APPENDICES

APPENDIX A ....Assumptions

APPENDIX B..Educational Telecommunications Online in New Jersey

APPENDIX C..School & Library Cost Data

APPENDIX D ....Revenue and Cost Reduction Initiatives

APPENDIX E ....Educational Technology Funding for K-12 Schools- Sources of Funding for Educational Technology, State by State

APPENDIX F..The Telecommunications Act of 1996 (Excerpted)

APPENDIX G ....Brief on Behalf of the Division of the Ratepayer Advocate on Universal Service Issues (Excerpted)

APPENDIX H ....Sources of Federal Technology Funds

APPENDIX I ....Sources of Further Information

BEST COPY AVAILABLE

Executive Summary

Funding Technology in New Jersey's Schools and Public Libraries By the End of the Century

> *Computers and other forms of technology are the modern day tools of America's society and culture, and as such, are as much needed in classrooms as books, periodicals, maps, tape recorders, VCR's, blackboards, pencils, papers, and even teachers. It is no longer possible for a teacher and a textbook to be the sole sources of information.*
>
> *- Leonard Margolis, Director, Academy for the Advancement of Science & Technology, Bergen County Technical Schools, Hackensack, NJ, at the Northeast Forum on the National Plan for Technology in Education (June 6, 1995). (http://www.ed.gov/Technology/Plan/RegionalForums/WhPlainshtml)*

The Federal Telecommunication Act of 1996 (the Act) establishes a new universal service mandate so that everyone, whether rich or poor, has access to educational and information resources available through the Internet and distance learning opportunities. The 1996 Act contains specific mandates to:

- provide assistance to **low-income** customers through federal programs and special provisions to make it easier for them to get connected to the network and to stay connected through affordable access to telecommunications service;

- provide an appropriate level of telecommunications service in all areas of each state, including **high-cost areas**, to ensure that all customers, irrespective of geographic location, receive the benefits of effective competition throughout the state;

- **provide discounts for telecommunications services to schools and public libraries, including access to state-of-the-art high-speed capabilities and internal wiring of all school facilities, as well as discounts for traditional telephone services.**

How New Jersey realizes this mandate and the extent to which State residents are connected to the information network will be a major test of whether we can develop a communications system that serves public needs and reduces social and economic inequities.

In this report, the Ratepayer Advocate proposes a comprehensive technology model for New Jersey's K-12 schools and public libraries to meet the needs of students, teachers, and citizens, allow for local control of technology planning and educational use, and provide for future information and educational technology development --- while making cost-effective use of the limited public and private funds available to pay for these systems.

BEST COPY AVAILABLE

The goals of this plan include: the establishment of a sufficient technological capability within schools so that students and school districts can obtain the benefits of networked learning opportunities; the provision of an appropriate number of computers in classrooms so that computer access is more than a dream to all New Jersey students; teacher training; and, the establishment of local libraries as technology centers that can be used by all residents to access information and job resources on the Internet.

Specifically, this report proposes a five-year cost model to provide all students in K-12 public schools with access to the Internet and the voice, data and video products within the premises that enhance distance learning. It also includes an estimate of the cost for K-12 non-public schools. Finally, the report suggests a cost model to provide all public libraries in the state with technology products and services needed to access the Internet and e-mail.

The cost model described within this report requires an investment of $2.860 billion over a five-year period -- $2.476 billion for public schools, $332 million for not-for-profit schools, and $52 million for public libraries -- but concludes that only $1.377 billion in new funding is required for public schools. This report also concludes that appropriate cost reduction initiatives and state and federal technology funds could provide the remaining $1.099 billion needed over five years to meet public school technology needs as described herein.

While these figures are significant, the new funding is only $232 per public school student per year. This represents about three percent of the current total annual cost per student in New Jersey. The cost to provide a technology-rich library system will be about $1.32 per patron per year.

The good news is that New Jersey is well-positioned to meet the technology challenges facing our schools and libraries. A recently completed survey provides the first comprehensive look at technology currently in New Jersey's schools.[1] With slightly more than 50 percent of all schools responding, the survey found that public schools already provide an average of one Internet-compatible computer for every nine students. The value of the installed technology products described in the survey results have been accounted for in determining the new funding requirements.

Recent state and federal initiatives are also bolstering existing funding for education technology, with the Comprehensive Educational Improvement and Financing Act of 1996 providing $50 million per year for five years for the provision of hardware, software, training and support.

---

[1] Quality Education Data (QED), in partnership with the New Jersey Department of Education, collected and compiled data from New Jersey's public and non-public schools and disseminated the results, the New Jersey State Technology Survey Report, on March 5, 1997.

But even with these achievements, which indicate the State's commitment to the development of an educational technology infrastructure, New Jersey schools will only be able to make meaningful use of these new technologies if stakeholders continue to take advantage of all funding opportunities.

Every state in the nation is currently facing these technology funding challenges. Public/private partnerships, as well as predictable sources of long-term funding, will be crucial to each State's success in meeting the technology needs of its residents. This report reviews various funding options selected by other states, including allocations from general funds, state and local bond initiatives, dedicated tax sources, earnings from state lotteries, telecommunications deregulation funds, private industry contributions, and, most recently, tax exempt leasing funds.

School and library discounts for advanced telecommunications services also will reduce the total figure to some extent. The FCC's universal service rules will make discounts available to public and not-for-profit schools and public libraries beginning in January 1998. School and library discounts for internet access tariff rates and internal connection will range from 20% to 90%, with schools and libraries located in economically disadvantaged areas eligible for the greater discounts.

This report also identifies more than 30 initiatives that could reduce costs by approximately $250 million. These initiatives range from encouraging the reallocation of existing funds to utilization of technology leasing programs, to encouraging school districts to form regional purchase cooperatives.

If New Jersey fails to ensure that all citizens have access to the educational and information resources presently represented by the Internet and distance learning technologies, we will be lowering our horizons and limiting our children's economic and educational opportunities. While "universal service" will not be able to provide an in-home computer to all who would like to use the Internet, it will measurably increase the ability of all citizens, including low-income residents and their families, to access the Internet through schools and libraries.

This Senate Special Study Committee can provide the leadership necessary to provide New Jersey students with the tools needed for the 21st century. Further, state government can provide the momentum to support and enhance current scattered school and community efforts to create networked education opportunities for all students. The Ratepayer Advocate would be pleased to provide assistance in this effort.

Developed with the assistance of the New Jersey Department of Education ("DOE") and the New Jersey Library Association, and with careful consideration of other state and federal technology planning efforts, this proposal seeks to meet the needs of New Jersey schools and libraries while making prudent use of a multi-year public investment in technology. The systems proposed in this technology plan are designed to provide real benefits to education in schools and information access in libraries, in a way that shares costs whenever possible and uses technology efficiently and effectively.

Finally, this report summarizes the Ratepayer Advocate's universal service proposal filed with the Board of Public Utilities ("Board" or "BPU") on December 11, 1996, regarding establishment of state discounts for telecommunications services provided to New Jersey schools and libraries. It will be considered by the Board as part of its generic investigation into local competition.

This proposal assumes that technology alone will not educate our children, create job opportunities, or reduce social inequities. However, distance learning and networked computer learning, are critical tools in accomplishing these goals when implemented with adequate preparation by teachers who receive support and training. This cost and funding plan assumes that these resources and attributes can and will exist and that the cost to the State will be far less expensive than the failure to provide the next generation with preparation for the future.

Introduction

In the information age, the human beings that industry needs are those who can do their own thinking, get actively involved, work in teams, and be innovative, not merely industrious. The problem is, the factory model school, which doesn't encourage those qualities, is still with us and needs to be replaced with a new kind of schooling that does.

-- Bill Blakemore, ABC News
http://www.nap.edu/readingroom/books/techgap/newmodel.html

Shortly after her election in 1994, Governor Christine Todd Whitman appointed an Economic Master Plan Commission (the "Commission") to determine the overall economic needs of New Jersey. In its January 1995 report to the Governor, the Commission concluded that a sophisticated, statewide telecommunications network will enable New Jersey to improve quality and parity in education and health care, while reducing costs and providing efficiencies. Such a network will help create jobs and begin to close the gap between those who are economically and socially disadvantaged and those who are not.

A little more than a year later, on February 7, 1996, the Federal Telecommunications Act of 1996 became law, ushering in a new era of competition and consumer choice in the telecommunications industry. While focusing on the benefits of competition, the 1996 Act also highlights the need for new universal service initiatives to insure that all citizens have access to critical telecommunications services.

Among the 1996 Act's universal service requirements is the mandate that telecommunications carriers provide advanced services to schools and libraries at a discount, affording the promise of distance learning opportunities and Internet access to all schools and libraries throughout the nation. The 1996 Act also recognizes that State action is appropriate, and, even necessary, to fulfill the national promise of ubiquitous access to the Information Superhighway.

Following passage of the 1996 Act, the New Jersey State Senate convened the Senate Special Study Committee on the Federal Telecommunications Act of 1996, chaired by State Senator William L. Ciesla, to investigate the impact of the 1996 Act on education in New Jersey. Senator William L. Gormley, a member of the Special Study Committee, at a special hearing on July 18, 1996, requested that the Ratepayer Advocate assist the mandate of the Committee by proposing specific models, funding mechanisms and dollars needed to insure that all New Jersey schools and libraries have access to advanced telecommunications technology.[2] The concern of the Senate Special Committee included both the costs of access to advanced telecommunications services and the cost of hardware, software, training and maintenance.

---

[2] See Transcript, pp. 21 - 22, 28, Public Hearing before the Senate Special Study Committee on the Federal Telecommunications Act of 1996 (July 18, 1996).

In response to Senator Gormley's request, the Division of the Ratepayer Advocate embarked upon a special inquiry to identify and quantify the costs -- hardware, software, interconnection, training, support and maintenance -- of providing telecommunications technology to all New Jersey schools and libraries as a means of assisting policy makers in their decisions concerning funding. This report also identifies key cost reduction and revenue initiatives that can have a potentially significant impact on the proposed costs. The cost impact of funding the tariff discounts for connection to all schools and libraries which also affects these costs is part of an ongoing generic proceeding at the Board.

Finally, we acknowledge the expertise and contribution of Lee McKnight, Associate Director, MIT Research Program on Communications Policy, Al Zeisler, President, Integrated Technology Education Group, and David Gingold, research associate, MIT Research Program on Communications Policy, who provided guidance regarding technology issues and who analyzed cost data concerning New Jersey schools and libraries. Their assistance was invaluable. We also recognize the contributions of the New Jersey Department of Education, with special appreciation and thanks to Julia Stapleton.

I. Goals

"Our schools are functioning under a model appropriate
for the Industrial Age, not the Information Age."
-- Dr. Beverly L. Hall, State District School Superintendent, Newark

Defining a technology model and the related costs of providing computers and advanced telecommunications access to New Jersey K-12 schools and public libraries are critical steps in insuring that New Jersey remains competitive in business and education, the ultimate objective of this plan.

To achieve this objective, the Ratepayer Advocate has determined that a coordinated approach must be developed before the year 2000 to provide all New Jersey residents with access to technology-based learning tools. The key to the success of this approach will be long-term funding of a comprehensive and realistically priced model. The cost model and funding approaches described in this report are intended to meet this objective and to:

- Provide all K-12 public schools with a common base of cost-effective technology, equipment and services to provide access to the Internet, e-mail and distance learning opportunities;
- Provide all K-12 public and non-public schools with discounted tariff service charges for use of advanced telecommunications services. For informational purposes, this report also includes cost data regarding equipment and services for not-for-profit schools;
- Provide all public libraries with cost-effective technology, equipment and services to provide access to the Internet with discounted tariff service charges and similar discounts;
- Ensure ongoing technology training and support for education and library professionals;
- Support the policy recommendations of the Department of Education's Plan for Educational Technology in New Jersey;
- Encourage accelerated installation of broadband telecommunications to all K-12 schools and public libraries by all telecommunication and CATV companies providing services in the state;
- Minimize the need for additional state or local funds by varied means discussed below, including making maximum use of all federal technology funds.

11

- Encourage public-private partnerships, especially among telecommunications companies and school districts.

These goals are consistent with the State's commitment to providing equity in all aspects of education and information access and to ensure that all students develop skills in the use of information and up-to-date educational technology. When these goals are met, New Jersey will rank among the nation's leaders in providing the infrastructure, information access and learning environment deemed so critical to supporting a productive and enriched education and business environment.

II. A Networked Education and Life-Long Learning Model for New Jersey Schools and Libraries

> *Exposure to computers has changed both the type of student I am and my methods for attacking problems. I now learn from multiple media, gain a far greater concept of the topics I pursue, and discover links and connections between them. My computer skills placed me in [the] job market doing work far removed from typical teenage job opportunities. I'd like to see every student get the same opportunities I have had.*
>
> *--Brian Sullivan, student, Academy for the Advancement of Science and Technology, Bergen County Technical Schools, Hackensack*
>
> *http://www.ed.gov/Technology/Plan/RegionalForums/WhPlains.html*

Technology is challenging the boundaries of educational structures that have traditionally facilitated learning, from the school room as the place where learning occurs, to the time limits of the school day, the academic year, and the role of the teacher as a unique source of wisdom.

Educators, politicians, community activists, and representatives of American business all agree that an education system must produce students with basic competencies in academic disciplines and problem-solving skills to create the workforce of tomorrow. Perhaps even more important, such an education system must motivate students and create incentives for them to be lifelong learners. Creative uses of the new communications technologies, i.e., broadcast and cable television, video cassette recorders, computers, CD-ROM, e-mail, the Internet, multimedia and new wireless technologies have the potential to engage people and instill a new excitement about learning.

This cost model for schools and libraries covers a five-year period and includes initial equipment costs, software costs, connection and access charges, ongoing operational costs, and the costs of providing support and training.

A. Technology for New Jersey Schools and Libraries

The elements of the comprehensive model for New Jersey schools and libraries will provide public access to the vast information resources of the Internet and support life-long learning by all community residents by providing computer access, Internet access, and distance learning for schools and libraries. As such, the plan is consistent with the State's Distance Learning Network initiatives. The details of other assumptions upon which this model is based are included in Appendix A, Assumptions, and Appendix B, Educational Telecommunications in New Jersey.

1. SYSTEMS FOR NEW JERSEY SCHOOLS:

Under the terms of this plan, at the end of a five-year period, one Internet-capable, multi-media computer will be available for every five students and one for each two teachers in all public K-12 schools throughout the state. A full distance learning capability also will exist in all school districts. Although the mix of technology based products and supporting applications and services enumerated below may differ by grade, an equal amount of money will be invested per student regardless of grade.

Computer systems:

- Multi-media computers for schools, enough to provide one computer for every five students and one computer for every two teachers.
- Appropriate software to maximize the benefits of educational use of computers.
- Printers, projection devices, and other peripheral equipment shared by computer systems throughout the school.
- Provisions for specialized peripheral equipment for science, art, and music classes and for students with special needs.
- Server computers that provide shared files, electronic mail, and World-Wide Web communication for each school.

Data communications systems:

- Local area networks that connect computers throughout each school, including multiple connections for every classroom, as well as wiring for telephone and video systems.
- High-speed network links that connect all schools together in each district.
- A high-speed Internet connection serving all schools in each district.

Specialized distance learning systems:

- One distance learning video classroom system and one transportable distance learning unit per school district.
- Television, video disk and VCR, audio conferencing, and fax equipment in each school to support distance learning.
- Educational video content subscriptions as needed for distance learning in schools.

Telephone systems:

- An on-premises telephone switch (or equivalent service) serving all schools in a district.
- Telephone capability in every classroom.

Training and support:

- Formal technology training for all teachers.
- Access to training resources at New Jersey regional education technology training centers.

See page 17 for further information regarding these centers.

- Support staff for educational technology, including one full-time technology director per average district, two full-time technology coordinators per district.
- Provisions for maintenance and supplies for all equipment.

2. SYSTEMS FOR NEW JERSEY LIBRARIES:

To provide computers and Internet access in New Jersey libraries, this plan proposes using similar technology to that proposed for use in schools, but implemented on a smaller scale. In addition, the library systems do not include the specialized distance learning systems proposed for use in schools. At the end of this five-year plan, there will be an average of six computers per average public library that will provide access to e-mail and information available on the Internet as well as from other library research resources.

Computer systems:

- Multi-media computers for libraries; six computers per average size library [based on a guideline of one computer per library plus one computer for every 4000 people served].
- Appropriate software to provide patron access to library and Internet information resources.
- Printers, projection devices, and other peripheral equipment shared by computer systems in the library.
- One server computer per library providing shared information access and World-Wide Web communication.

Data communications systems:

- A local area network connecting computers within each library.
- High-speed network links connecting each library to a community network.
- Access to a high-speed Internet connection serving schools and libraries in each district.

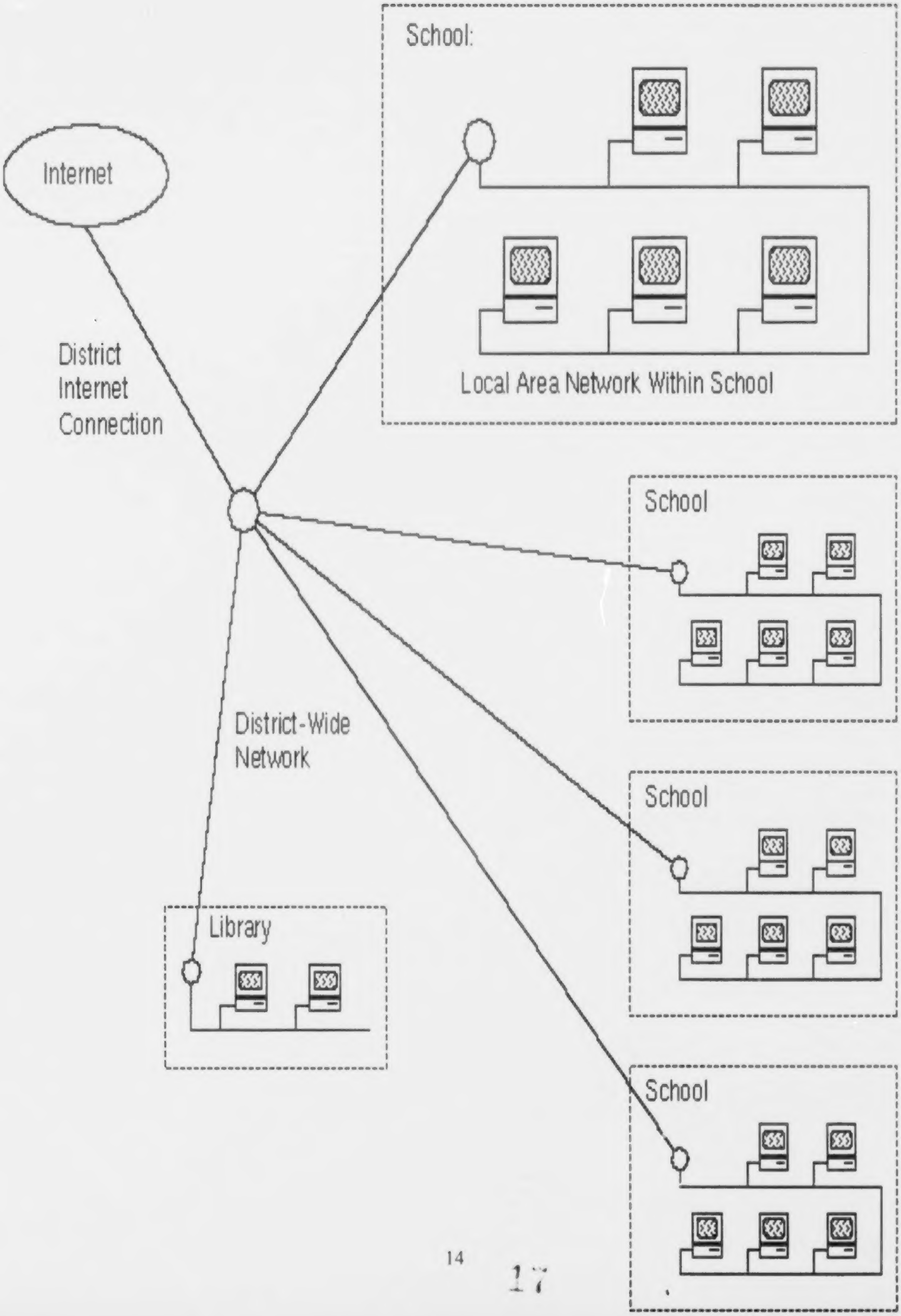
Training and support:

- Formal technology training for library staff.
- Access to district-wide educational technology support staff and regional technology consultants.
- Provisions for maintenance and supplies for all equipment.

B. Effective Use of Technology

1. COMPUTER AND NETWORKING SYSTEMS

The architecture of the model described within this report follows the "star" configuration, in which many schools in a district are connected through a single hub. In this way, costs can be aggregated and the architecture will reflect the administrative design of the school system, with individual schools reporting to a district office. The specific services/products described were selected because they use tested technologies that can be deployed immediately. Finally, the ratio of one computer to five students was selected in consultation with the Department of Education, which has concluded that this model provides the most cost-effective use of advanced telecommunications services for educational use.


Internet
District
Internet
Connection
School:
Local Area Network Within School
School
District-Wide
Network
School
Library
School

Within a district, there are three major components of computer networks:

- A local-area network within a school or a library that connects computers, file servers, and other equipment together;
- A network that links schools and libraries together within a community; and,
- A single high-speed Internet connection that is shared by the entire district.

This network technology provides the following educational benefits and cost savings for computer systems in schools:

- The local-area networks allow all computers in a school to share file storage, printers, scanners, and other equipment, potentially reducing equipment, software, and maintenance costs;
- Networks within schools enable communication through electronic mail, file sharing, collaborative educational software, and World-Wide Web access. This can promote collaborative student work and emphasize written communication skills;
- A network that connects all classrooms in a school allows equipment to be moved into classrooms as needed, and allows educators to locate systems where they can be most effectively used;
- District-wide networks allow students and teachers to share information between schools in a district, and allow support staff to maintain computer systems remotely;
- District-wide networks additionally allow a single, high-performance Internet connection to be shared by the entire district. The entire network system brings high-speed Internet access to every school and every classroom in the district.

Computers and networks can play a crucial role in promoting distance learning in New Jersey.

Through district-wide computer networks and the Internet, teachers and students can exchange information, collaborate on work, and communicate directly with other schools throughout the State and the world. High-speed access to the Internet brings a wealth of information resources to students that goes far beyond what school systems themselves can afford to provide.

District-wide networking allows libraries to share the benefits of the technology used in schools.

By connecting computers in libraries and the school computers to a single community-wide network, libraries can access the Internet through the same high-speed connection that serve the schools. Furthermore, libraries can make use of the support and training resources that are used in district school systems.

BEST COPY AVAILABLE

2. SPECIALIZED DISTANCE LEARNING SYSTEMS

This plan provides access to one full-motion, high-quality video-based distance learning classroom for every New Jersey school district. Such systems already are being implemented in some New Jersey schools, with industry, local, and state government support. These classrooms allow students to take classes that would not otherwise be available to them, and can be used by teachers for professional development and faculty conferencing. Distance education systems are an important tool for developing equal educational opportunities for students throughout the state. However, the rapid evolution of digital technology, and the rapid reduction in costs of such systems is also a factor to be considered.

New Jersey schools should consider using advanced Internet-based video distance learning systems as they become available. With such systems, schools might use their existing computers, computer networks, and Internet connections to provide video-based distance learning to any classroom in a school, thus saving both equipment and telecommunication costs associated with specialized distance learning systems.

Systems currently in place in some schools may not prove to be cost-efficient compared with Internet-centered networked education delivery systems, which will be available and increasingly affordable within the next few years. Although Internet-based video conferencing systems available today may not perform well enough for interactive classrooms, several recent technology advances will improve this situation: better video compression techniques, faster computers, and computer networks that can better support video transmission over the Internet. The computer networks proposed for New Jersey schools will have sufficient capacity to support these advancd video and multimedia conferencing technologies and provide distance learning capabilities integrated into a networked education technology platform.

It is recommended that every new personal computer purchased by a school before the year 2000 be capable of receiving and sending video and multimedia content, at minimal additional cost (i.e., addition of video cards and low-priced cameras). In fact, costs may be significantly lower. While this may seem optimistic, the trends in cost reduction and capability increase for computers and networks suggest that there is a real possiblity of reduced costs and that one would be remiss not to include this eventuality in current consideration of future plans for distance education as part of networked educational systems.

The specialized distance learning systems used today cost a school $25,000 to $50,000 for equipment and an average of $16,000 per year for transmission costs for a single distance learning classroom.[3] It is estimated that in the near future, the use of existing computer and network equipment in schools to provide an equivalent integrated distance learning capability, even without affecting the costs of educational distance learning programming and content, would save approximately half of the total distance learning costs represented in this plan.

---

[3] The system described provides full-motion interactive video provisioned over DS-3 fiber optic transmission medium by Bell Atlantic-New Jersey. Source of Information: NJ Dept. of Education.

In estimating the cost of distance learning, school districts also need to incorporate the cost of subject matter content. Schools currently share distance learning resources; others exchange or barter teachers' services; and still others obtain content without cost as part of experimental distance learning programs. Consequently, it is difficult to estimate accurately the future costs of distance learning content. It is only possible to say that, as distance learning matures, there will be content costs as well as hardware costs.

3. Telephone Systems

Modern telephone systems can provide important benefits to teachers and students, including voice mail that allows teachers to stay in touch with parents and students, better communication within schools, and access to fax machines (to send/receive homework and assignments for distance learning classes). Unfortunately, at this time, most classrooms lack even the wiring for basic voice-grade telephone systems.

Along with installing computer network wiring in classes, this plan proposes installing wiring for telephone systems (adding little to the overall wiring costs) and installing a telephone system, or making provision through local telephone switching centers, for each district that would connect every classroom in every school.

4. Support and Training

Using computer and Internet systems in New Jersey schools at the level that this plan proposes represents significant changes to the education process in schools. Successfully carrying out these changes requires the primary involvement of educators, who will require training in using these systems and in integrating the technology into their curricula. Without adequate training for teachers and librarians, the promise of networked education will be significantly limited. Consequently, teacher training is an essential component of this educational technology model, and represents a significant cost to schools.

This plan budgets for teacher training in proportion to equipment costs, allocating $27,500 per school per year. By utilizing new regional Educational Technology Centers and community resources, districts can maximize use of training funds.

These Educational Technology Training Centers will be established in each county of the State beginning this summer as part of a grant program developed by New Jersey Department of Education. The Centers will provide staff development opportunities and technical assistance for K-12 educators.

III. Educational Networking for New Jersey: The Costs

"If you think education is expensive - try ignorance."
-- Derek Bok

The projected costs discussed in this section do not include potential cost savings associated with leasing or savings associated with current equipment already in schools. This report calculates the overall cost of implementing this technology in a five-year model as discussed earlier, assuming that all equipment is purchased in the first year.[4]

The cost components in this section are divided into the following general categories:

- ***Computer Equipment:*** computers, printers and other peripherals, software, and servers that are used within schools and libraries;
- ***Distance Learning Equipment:*** specialized interactive full-motion video systems used for distance learning, as well as video systems and video and distance learning content materials;
- ***In-School and In-Library Networks:*** local area network wiring and electronics costs;
- ***District Networks:*** networks that connect schools together in a district, including routers and associated network equipment and also including telecommunications costs;
- ***Internet Connection:*** a district-wide network to the Internet, including telecommunications costs;
- ***Telephone Systems:*** the cost of providing telephone systems for schools, not including telephone usage costs;
- ***Training***: the cost of providing training for teachers and administrators,
- ***Support:*** support staff for technology systems, repair costs for equipment, and supplies for equipment.

Several important conclusions from this cost model emerge. First, support and teacher training represent roughly 51% of the total cost of implementing this educational technology in schools. In turn, approximately two-thirds of these costs are staff costs for maintaining equipment and facilitating educational uses of the technology. The training costs include tuition and transportation for attendance at formal training seminars.

Second, although this plan calls for highly functional computer networking (i.e., connecting all classrooms in schools and building high-speed district-wide networks), the overall cost of these computer network components is small compared with the costs of the computer equipment itself, and represents less than ten percent of the overal cost for the plan.

---

[4] See Appendix C for a spreadsheet describing these costs in detail. School systems and libraries may prefer to implement these systems over a number of years. The needs to upgrade physical facilities, provide teacher training, and integrate the technology into curricula may prevent schools and libraries from purchasing all systems initially as this plan proposes.

Third, the cost of computers represents about 32% of the total cost of this plan.

Finally, the specialized distance learning systems that are included in this plan represent a substantial cost to schools that can be justified by the enhanced quality and equity in education that these systems bring. To the extent that the availability of newer technology can allow ordinary computer and network systems to do what these systems do, New Jersey may find in the future that specialized distance learning costs could be reduced.

A. Public School Costs

Providing these systems to the 2,302 public schools in New Jersey would require an expenditure of $2.476 billion over five years, or $495 million per year. ***The average cost per student to implement this plan is $417 per year, of which $232/student/year is required in the form of new funding.***

The table below shows the five-year·cost of the plan for a typical New Jersey school:

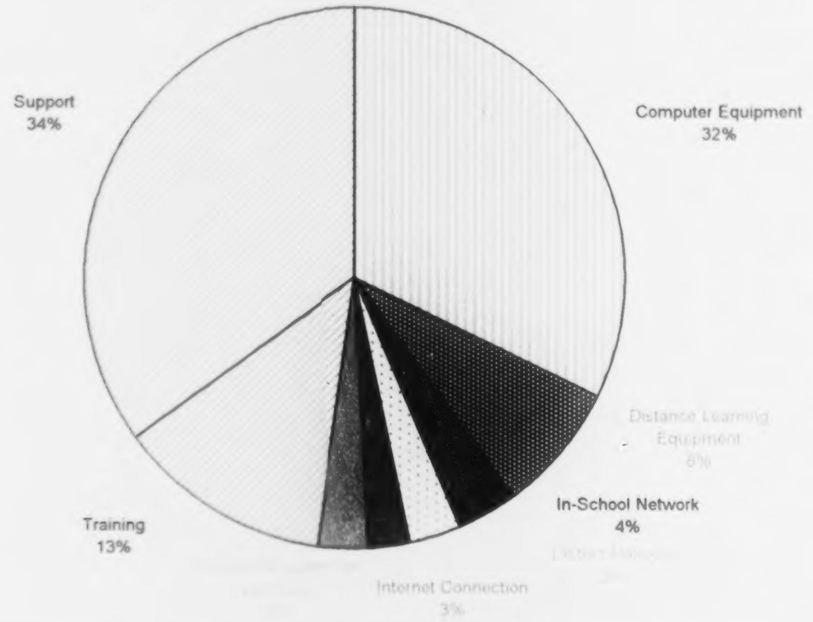
Component:	**Per-School Cost**
Computer Equipment	$346,125
Distance Learning Equipment	83,850
In-School Network	39,220
District Network	32,132
Internet Connection	27,810
Telephone system-on premises	31,200
Training	137,500
Support	377,814
Total:	$1,075,652

The chart included on the next page provides a graphic view of the cost of school components, assuming that a school was beginning the process without any technology in place.

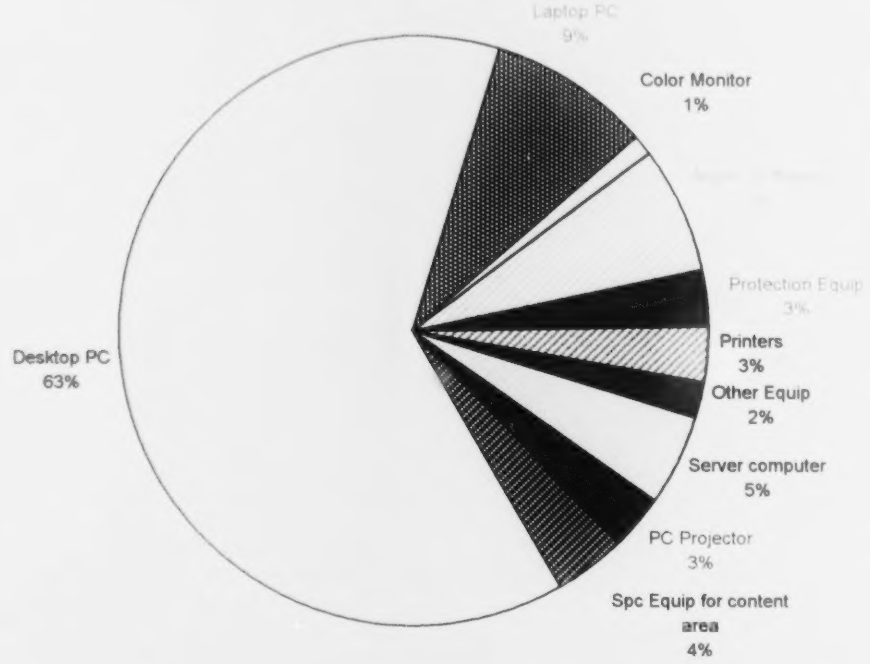
In fact, most schools will need to spend considerably less to develop a technology-rich environment, in light of data set forth in the 1996 New Jersey State Tech Survey Report. That survey, developed by the New Jersey Department of Education and QED (Quality Education Data), provides a snapshot of technology now in our schools. As stated earlier, that data show that there is on average one Internet-compatible computer in place for every nine New Jersey public school students. The ways in which data from this survey potentially reduce the total cost of technology for New Jersey public and not-for-profit schools is set forth in Appendix C of this report.

BEST COPY AVAILABLE

School Cost Technology Related Components



Computer Related Equipment Allocation



BEST COPY AVAILABLE

B. Library Costs

Providing computer and Internet access in 400 libraries in New Jersey, in conjunction with the school systems proposed, would require an overall expenditure of $51.8 million over five years, of $10.3 million per year. The cost of this plan per person served is $1.32 per year.

Compared with the systems for schools, the systems proposed for libraries represent a very small cost, less than two percent of the costs of school systems. Because several important costs (such as those of Internet access, support, and training) can be shared by schools and libraries, implementing these library systems would economically provide substantial benefits to the entire community.

As with schools, support and training for library systems represent a major portion of the total costs.

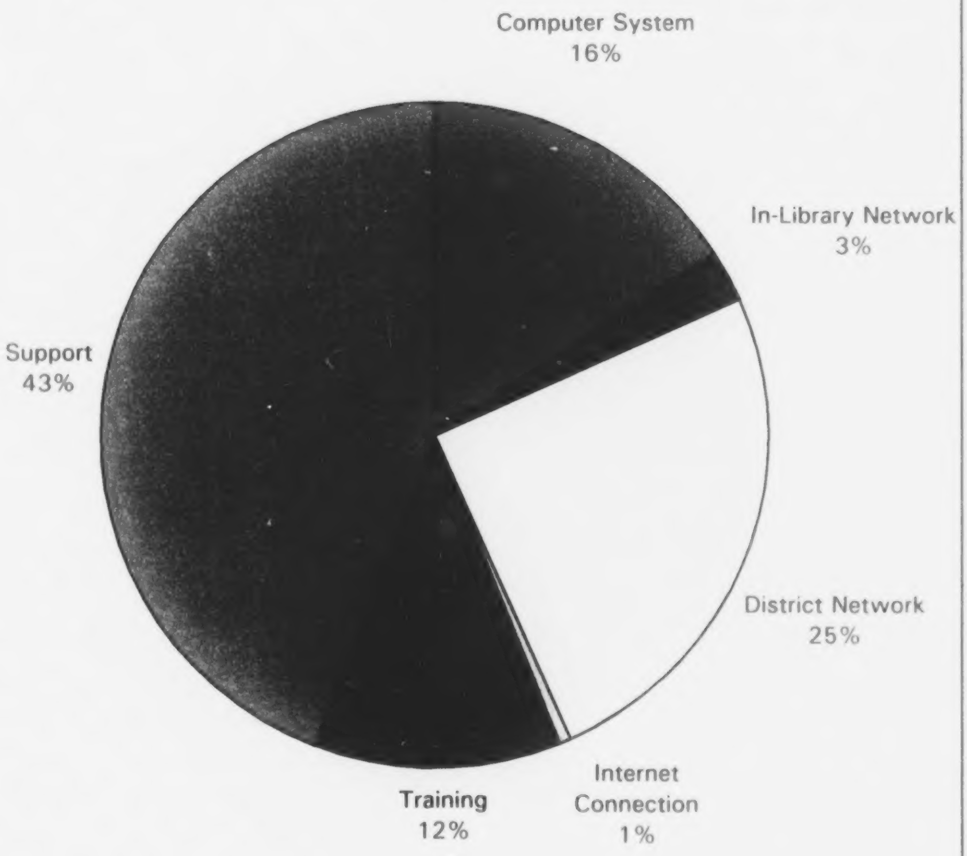
The district network in this plan accounts for a much larger portion of the total cost because the same type of networking link that is used for a school (which has a much larger overall cost) would be provided to a library. Such a link is valuable for library systems, however, since even a small number of computers can take advantage of the high performance of the district network and the access it provides to the Internet.

With an average of six computers per library, the typical library cost breakdown is shown in the table below:

Component:	**Per-Library Cost**
Computer System	$20,550
In-Library Network	3,360
District Network	32,132
Internet Connection	921
Training	15,413
Support	57,220
Total:	$129,596

The chart provided on the next page provides a graphic view of the cost of library components.

Library Cost Components



BEST COPY AVAILABLE

IV. Funding Options for New Jersey

> *"The legitimate object of government is to do for a community of people, whatever they need to have done, but cannot do at all or cannot so well do for themselves, in their separate and individual capacities."*
>
> *-- Abraham Lincoln*

With a special focus on funds for telecommunications at the K-12 level of education, this report presents the range of funding models that might be adopted by New Jersey. A state-by-state chart of funding systems is included. A discussion of the potential impact of the FCC final universal service rules for discounted advanced telecommunications services follows. Finally, recommendations for New Jersey funding policy and direction are offered.

With the best of efforts there will be a need for approximately $1.605 billion in new funding over five years to meet the technology needs of New Jersey's public and private K-12 schools and libraries.[5] States across the country are faced with the same challenge, and, like New Jersey, are seeking unique funding methods.[6]

In this report some of the advantages and disadvantages of funding models implemented by other states are presented so that New Jersey can select, adopt, or adapt the best features of some of those models--while developing its own funding solution, based on New Jersey's own political, educational, and financial needs.[7]

A. State Technology Funding Approaches

States have established several methods for funding educational telecommunications: legislative appropriations; bonds; telephone company excess earnings; lottery income; special dedicated taxes; user fees; and miscellaneous funds. The most common methods are legislative appropriations and telephone company excess earnings.

---

[5] New funding needed for public schools and libraries totals $1.429 billion over five years. New funding needed for public schools alone totals $1.377 billion.

[6] A full list of potential cost-savings opportunities and revenue initiatives is attached as Appendix D and discussed in Sections V and VI.

[7] This national overview is based on Hezel Associates' annual research report, *Educational Telecommunications: The State by State Analysis*. A state-by-state analysis of funding methods is attached at Appendix E.

1. **Legislative appropriations** are made annually or biannually, depending on the state's budget cycle. In a few states the allocations are sporadic or even one-time-only events. Typically, the legislature appropriations funding to the state education agency, which, in turn, distributes to the schools, either on a per-pupil basis, through competitive grants, or on the basis of a completed technology plan. The technology plan is important because it assures that schools have considered all of the educational and technology planning system requirements.

Examples of States using legislative allocations are: (1) **Ohio**, where the state has made an allocation of $95 million for School-Net to supplement Ameritech's excess earnings fund and; (2) **Pennsylvania**, where the Governor has made a special case to the legislature for an allocation of $120 million over three years for the development of Link-to-Learn, a project to place computers and networking capabilities in all schools.

Pros: Legislative appropriations tend to demonstrate commitment by the legislature to educational technology and provide a quick infusion of funds into the enterprise.

Cons: Commitments can waiver from year to year, leading to instability of technology funding. Furthermore, appropriations depend entirely on tax revenues, which can vary and can become implicated in political battles at a higher level.

2. **Bonds**. Instead of dipping into the state's general fund for technology, a few states establish bond funds. In such cases a popular referendum often is required to secure the funds, as the bond often is substantial and places the state in debt with interest payments greater than the principal itself. Bond funds typically are distributed through the state education agency or the department of information technology. Because bonds tend to be longer term, they often are not used for the acquisition of computer hardware and equipment.

Examples of bond fund use include **Mississippi**, where the state has approved a bond of $41 million for school technology.

Pros: Bonds allow greater stability of funding over a longer period of time, and they permit immediate acquisition of technology hardware. Also, the immediate and direct impact of technology acquisition on the state budget is not so readily apparent through bonds.

Cons: Bonds tend to use a long-term solution for a short-term investment, so the state must continue to pay for the technology long beyond the useful life of the technology itself. A substantial portion of the bond payment is interest, which results in higher cost for equipment. Finally, bonds that require a public referendum require advocates who are willing to invest time, effort, and money campaigning for the successful passage of the referendum ballot.

3. **Designated Taxes.** Special dedicated taxes can be established by legislatures to acquire funding for educational telecommunications. Only one state, **Missouri**, now has such a tax--on videotape rentals--dedicated to education (specifically to video telecommunications). **Alaska** also

has a tax on oil drilling, but those oil royalties are directed to the general fund, not just to technology. While there appears to be little taxpayer complaint about the Missouri video tax, such a designated tax collected on a frequently acquired consumer item can disturb the public.

4. **Lotteries.** Widely viewed as a painless way to capture moneys for designated purposes, many state legislatures have used the lottery as a means of funding education, and one state, **Georgia**, relies on the lottery to fund educational technology. The designation of lottery profits to educational technology requires a legislative act. Within states, lottery income varies from year to year.

Example. Georgia's lottery has provided a means of sustaining the telecommunications infrastructure established by the initial excess earnings fund in 1992. Whereas an excess earning fund of $50 million provided the capital funds for the infrastructure, the lottery profits pay the operating costs of the system. The lottery proceeds continuing fund now contains about $70 million, and is used mostly to support distance education.

Pros: Devoting lottery funds to education requires no funding from general revenue, and therefore no raising of taxes or reducing appropriations to other services.

Cons: Reliance on lottery funds for education sometimes undermines the state's basic commitment to the financial support of education through the general revenue. In some states general fund spending for education has declined after the designation of lottery profits to education. Furthermore, the lottery profits vary from year to year, leaving the beneficiaries--educational institutions--uncertain of their funding.

5. **Telco Deregulation and Excess Earnings Funds.** Depending on whether a state--and its public utilities commission--has rate cap regulation or incentive regulation, or has relatively little regulation at all, considerable sums of money might accrue from telecommunications providers on behalf of educational telecommunications in lieu of direct refunds to customers. PUCs sometimes require refunds to ratepayers, but increasingly, state legislatures consider excess earning funds and overcharges as a means to deliver substantial funds to educational institutions.

Examples. Michigan and **Georgia** are just two of the states in which education has benefited from excess earnings funds. In Michigan $10.5 million was placed in a fund, distributed by a state commission, for infrastructure development. In some cases, such as **Texas**, telephone companies contribute to an educational technology fund in exchange for deregulation. (See discussion on Texas in Appendix E).

Pros: The dedication of excess earnings to a related activity, the development of technology infrastructure, carries some commitment from technology-interested parties. The excess earnings fund is an "invisible" fund in that it has no impact on the state's general fund.

Cons: Targeting excess earnings and overcharges to education require some political maneuvering. Technically, the fund belongs to ratepayers, who might wish to receive a rebate instead of dedicating it to a "government" project. In addition, deregulation funds, though they benefit a worthy educational purpose, might be perceived as anti-consumer, because they remove some consumer protection regulations.

6. **Private Industry Funds**. In a few states, the respective departments of education seek funds from key in-state business partners, which take tax write-offs for their cash or equipment contributions. **Vermont**, for example, has benefited from a $2 million grant from IBM. The businesses gain good will for their generosity by promoting their assistance to education.

7. **Cost Recovery Systems**. In a few states, such as **Oregon** and **Florida**, there is an expectation that user fees from individual institutions will fund educational telecommunications. **Florida** charges schools for the use of its video conferencing system. **Oregon**, which had expected to break even on its EdNet investment through user fees, now returns to the legislature biannually to request a supplement to the user revenue.

B. An Overview of Tax-Exempt Leasing as a School Funding Source

Tax-exempt leasing is one option for providing funding that is gaining acceptance in public and not for profit schools throughout the country.

Like a car lease, a tax-exempt municipal lease allows for the purchase of a product by making a series of fixed payments over a period of time. But unlike a car lease, a tax exempt municipal lease is offered at an interest rate that is comparable to that of a small bond issue. Since it often is configured to assure that there is no residual value, it eliminates the need for a final lump sum payment, yet all the products will be owned by the school at the end of the lease period. The lease can be configured to cover hard goods (i.e., the product), as well as infrastructure, services, maintenance and training.[8]

A tax-exempt lease offers certain advantages when compared to other funding programs:

1. Project financing often can be obtained without a down payment;
2. The lease agreements are structured to meet IRS requirements, so the interest component of the lease payment is exempt from federal income taxes. In turn, this lowers the interest rate paid by the school;
3. A lease agreement guarantees both a fixed payment amount and a fixed lease term;
4. The lease agreement is subject to annual appropriation, so voter approval is generally not

---

[8] The extent of coverage is a function of the offering of the leasing company, and comparative shopping is recommended.

required;

5. Tax exempt financing is available for most essential use applications, and just about all technology related projects would be considered essential applications;
6. It is easier to administer than a bond issue, and has significantly lower administrative and issuance costs; and
7. It can be made available to not-for-profit education facilities (i.e., private schools).

The most valuable quality of a tax-exempt lease is that it allows the school administrators to relate the pay back period for technology funding to the life expectancy of the equipment, or duration of the related service. In this way obsolescence can generally be avoided. Another advantage is that once a product is owned it can be sold, if desired, without the administrative complexities involved with joint ownership. A lease, due to its shorter terms, facilitates this option, thereby allowing schools to recover the residual value of some of its obsolete or unused equipment.

With increasing recognition of the need for integrated technology systems, as opposed to stand alone products, the advantages of a payment program that can be related to the life cycle variables of each of the components become even more valuable. Technology systems are comprised of a vast array of products and services. Computers, printers, scanners, video systems, VCRs, telephone systems, communication networks and software are just some of the key components. To assure that all these products work properly and support a positive learning environment, there is a need for extended electrical power access, properly configured furniture, and enhanced environmental systems and controls. Each of these components has its own forecasted useful life. A lease allows the financing terms to reflect the differences in the useful life of each project component.

A lease-purchase option generally is considered an operating expense for accounting purposes. When the lease is structured specifically for a state or local institution the funds, even though applied toward the capital expenditure, tend to come out of the operating budget, generally considered to be debt. The reason that it is not considered debt is that there is non-appropriation language in this type of lease structure. If the institution is not appropriated funds in each subsequent fiscal year, the lease can be terminated, and the equipment can be returned with no legal obligation or liabilities going forward.

C. Discounts for Schools and Libraries: An Overview of Federal and State Regulatory Proceedings Regarding Universal Service

1. *The new Federal Communications Commission rules will provide eligible K-12 schools and libraries with discounts ranging from 20% to 90% for the purchase of all telecommunications services, Internet access and internal connections.*

The Telecommunications Act of 1996 requires the FCC and the states to ensure that quality telecommunications services are available to all Americans at affordable rates. Notably, the Act makes the provision of advanced telecommunications services to all schools and public libraries a national priority.

To implement the mandate for universal service set forth in the Telecommunications Act of 1996, the FCC adopted final rules on May 8, 1997. See *In the Matter of Federal-State Joint Board on Universal Service,* CC Docket No. 96-45, Report and Order (Adopted May 8, 1998).

The FCC universal service rules will provide eligible schools and libraries throughout the country with discounts ranging from 20% to 90% on the purchase of all telecommunications services, including Internet access, connection charges, monthly tariff rates and internal wiring, with higher discounts being provided to the most disadvantaged schools and libraries. Specifically, the level of economic disadvantage will be measured by eligibility for the federal school lunch program.

Total expenditures for federal univeral service support for schools and libraries is capped at $2.25 billion per year, with a roll-over into following years of funding authority, if needed of half the funds not disbursed in any given years. No more than one billion dollars will be available to schools and libraries for the funding period from January 1, 1998 through June 1998.
The FCC's rules will permit schools and libraries to begin receiving federal universal service support for telecommunications services in January 1998.

At this time, it is impossible to calculate the extent to which New Jersey's schools will qualify for such assistance in competition with the schools and libraries of other states, or the degree to which the annual "cap" will limit that assistance. However, even if New Jersey were to receive a pro rata share of the schools and library cap proposed by the Joint Board, speculative at best, the annual funding may be only about $45 million.

Research indicates that the amounts needed to achieve a fully functioning advanced telecommunications and educational network in New Jersey will be far in excess of $45 million per year. It also should be noted that the federal support program takes little note of the particular needs of any school or library. Instead, assistance is allocated on the basis of economic disadvantage of the pupils. While that disadvantage likely will correlate somewhat with the needs of schools, it is also possible that older schools, including many in New Jersey, will require a greater than average level of assistance, apart from their own particular economic disadvantage, because of the age of the school buildings. Finally, it is still unclear whether the FCC will adopt the Joint Board decision.

That final rules offer many meaningful measures to begin the task of meeting the 1996 Act's universal service goals. But the fact that the broad scope of these goals do not lend themselves readily to fit the individual circumstances of each state, leave the states with the primary responsibility for ensuring that the benefits promised from universal service will be obtainable.

2. *New Jersey schools and libraries will only be eligible to receive FCC discounts if New Jersey establishes equivalent discounts for intrastate telecommunications services.*

New Jersey K-12 schools and libraries can only obtain federal universal service support if the New Jersey Board of Public Utilities establishes discounts on intrastate services at least equal to those established by the FCC rules. The FCC's Report and Order on universal service states that, "we require states to establish intrastate discounts at least equal to the discounts on interstate services as a condition of federal univeral service support for schools and libraries in that state." Final Order, Para 550. The rules also states that, "[f]ederal universal service support . . . for eligible schools and libraries in a state is contingent upon the establishment of intrastate discounts no less than the discounts applicable for interstate services." To be codified at 47 C.F.R. Section 54.506(c)(1).

The BPU regulates intrastate telecommunications services, which includes local phone calls. Only the BPU has the authority to set rates for those services as well as the authority to determine whether there must be discounts on intrastate, or local, rates for schools and libraries. The BPU has set a schedule for hearings, which will take place in September 1997, to examine this issue and whether New Jersey should establish its own universal service fund.

To ensure that the residents of New Jersey receive the benefits of universal service, the Ratepayer Advocate has recommended to the BPU that a New Jersey-specific universal service fund be established to guarantee that all New Jersey schools and libraries receive discounts for advanced telecommunications services.[9]

The Ratepayer Advocate has recommended that the Board establish a telecommunications fund that would provide a discounted price for all telecommunications services to schools and public libraries. This state-based fund would be consistent with FCC universal service support, while avoiding certain fundamental limitations that represent potentially serious defects applied to New Jersey. These limitations include the fact that the proposed cap on total annual spending means that some New Jersey schools may not receive any discount; and, that the discount may not be sufficient to provide services to some schools with aging physical plants.[10]

---

[9] These recommendations were made as part of the BPU's investigation and rulemaking proceeding to determine whether or not to permit local exchange competition in New Jersey. In January 1996, the BPU issued its Notice of Pre-Proposal and Investigation ("NOI"), which requested comments on general issues of competition in the telecommunications industry, including universal service, affordability, and interconnection. Subsequent to the Board's initiation of the NOI, the 1996 Act was signed into law on February 8, 1996 which, as discussed earlier by its express terms, mandates the opening of all telecommunications markets to full competition. Evidentiary hearings in the NOI proceeding were commenced by the Board on September 9, 1996, and parties have submitted evidence to the BPU regarding the issues of the cost of basic telephone service, and the wholesale/resale rates to be permitted under the provisions of the Act. Parties to the NOI proceeding filed initial briefs with the BPU regarding the universal service provisions of the Act and the establishment of discounts for schools and libraries on December 9, 1996, with evidentiary hearings to be conducted in March 1997. The Division of the Ratepayer Advocate has been an active party to these proceedings.

The Ratepayer Advocate has proposed that, as an initial measure, the Board adopt the discounts set forth in the Final Rules, without the cap, as the level of discount to be afforded to New Jersey's schools and libraries.

In addition, the Ratepayer Advocate has urged the Board to require telecommunications providers to offer schools and libraries local exchange service and all other services at residential rates. Schools and libraries currently receive these services at a higher, business rate.

---

[10] An excerpt from the Ratepayer Advocate's brief on universal service issues is attached as Appendix G. This excerpt includes the recommendation that the BPU establish a state universal service fund for discounts to schools and libraries.

D. Additional Funding Options For New Jersey

There are other funding options which should be examined. These include:

- Marketing distance learning programs produced by the NJ Education Network outside of New Jersey;
- Offering for a fee access to the technology equipment in schools and libraries to local civic and community organizations; and suggesting the expansion of voluntary contributions for the use of technology equipment in public libraries.
- Insuring that New Jersey makes maximum use of available state and federal technology funds:
- Although new funding methods will be necessary, there are existing pools of federal and, possibly, state money that New Jersey schools and libraries should tap to the maximum extent possible.[11]

---

[11] See Appendix H for a description of various federal technology funding options. See also Appendix B for a brief description of proposed state legislation that could affect technology funding.

V. Cost Reduction Opportunities

Given the magnitude of the financial and administrative challenges arising from this proposal, cost-savings initiatives are essential. There are significant opportunities for the State, local schools districts, school boards and library trustees to minimize program costs. School districts can negotiate discounts on hardware and software by aggregating purchases within or among districts; previously budgeted funds may be reallocated when technology replaces an existing function or need; technology support can be obtained from vocational schools, community colleges, and the state university and local volunteers; building additions can make provision for tomorrow's needs.

Although the full extent of savings resulting from each of these cost reduction opportunities will vary based upon the vigor with which they are undertaken, it is believed that more than $325 million can be saved, with an optimum $585 million savings opportunity.

A full list of revenue and cost-reduction initiatives that the State and individual school districts may wish to consider, potentially totaling $585 million, is included as Appendix D. Highlights include:

- Encouraging schools and public libraries to jointly plan and utilize local telecommunication facilities. Possible savings are **$20 million**.

- Encouraging the use of community colleges, vocational schools and the State University system to develop a program whereby technical students can provide support to K-12 schools for the installation and maintenance of the technology system. Possible savings are $5000 per year per school, for a five year total of **$57 million**.

- In the context of the New Jersey BPU proceeding to investigate local telecommunications competition, seek approval of preferential rates and/or discounted tariff rates from all telecommunication providers for services offered to schools and libraries. Plan assumes a **15% reduction** in overall tariff network charges.

- Introduction of a technology equipment repair program at various vocational schools throughout the State, and negotiating reduced repair rates for schools and libraries. This will lower costs and provide student training in a growth industry. Possible savings are **$17 million**.

- Actively encouraging the use of leasing and lease-purchase options in lieu of product purchase. A life cycle reduction of two percent or about **$40 million** is anticipated.

- Encouraging the use of local residents as volunteers in all areas related to technology based systems. Assuming a saving of 50 hours per year per school, at $40 per hour this equates to a saving of **$23 million**.

- Seeking to combine district level installation, maintenance and support operations of the technology system under one contract. Savings could be **$20 million**.

As stated earlier in this report, the cost model described herein requires an investment for public and not-for-profit schools and public libraries of $2.860 billion over a five year period; but concludes that $1.377 billion in new funding is required for public schools alone. This report also concludes that cost reduction initiatives and use of state and federal technology funds can reduce that funding requirement for public schools by $1.099 billion.

- Approximately $325 million in savings with an optimum from the initiatives listed herein with;

- $187 million in savings from negotiation of discounts -- which could total 20% -- from list prices for products and services;

- $545 million from business and local citizens, grants, federal funds and gifts of equipment;

- $140 million estimated as the value of current equipment installed in New Jersey's schools (Note that the value of existing equipment in schools and libraries has been discounted based on expected replacement needs over a period of five years.);

- Approximately $60 million from the sale and/or transfer of unnecessary equipment to New Jersey residents or state governmental agencies.

VI. Some Immediate Steps To Be Taken

Since New Jersey's K-12 schools and public libraries must have access to increased funds if they are to deliver on the promise of technology and connection to the Internet, it is essential for the state to obtain the support of all its residents when it undertakes this initiative. Technology must not be viewed as an end unto itself, but rather as a catalyst for change and an agent for discovery. Successful implementation of a technology program requires planning, continuity, continual measurement against goals, a willingness to make adjustment in direction, a management team of knowledgeable and committed personnel, and a recognition that this program will take many years to reach all its goals.

For New Jersey school districts and libraries to become networked and reap significant benefits before 2000, we suggest the following immediate steps to accomplish these goals.

Identify the real costs.

The cost of computer networks within schools and libraries, as well as the cost of connecting to the Internet, is small relative to overall technology costs, and the costs of providing support staff and teacher training and maintenance.

Focus on the real benefits.

The benefits of network technology are substantial, both in terms of increasing access to information and reducing system costs by allowing resources to be shared among computers. Continue to educate stakeholders about creative ways that New Jersey educators are finding to integrate new technologies into K-12 curriculum.

Designate a state technology coordinator for schools and libraries.

To reduce the costs of providing schools and public libraries with technology, it is crucial that an individual or group of individuals coordinate public and private efforts and ensure that New Jersey takes advantage of all available federal technology funds.

Share information on technology purchases, curriculum development, and teacher training at the state level. Encourage group purchasing and/or leasing to maximize savings.

State-wide, district-wide, and coordinated local school and library planning can reduce costs. For example, large scale purchasing of equipment can significantly limit expenditures. Some state-wide planning may help New Jersey school districts adopt effective technology for schools and libraries. While the state will not buy equipment, the state could issue a list of preferred vendors to help insure significant discounts. Furthermore, DOE should consider how the new regional technology training centers could provide opportunities for group purchasing.

as well as teacher training.

Encourage leasing.

A school district should calculate both the costs of leasing and buying, as part of its routine technology planning. The former could be an attractive option for many New Jersey communities, and information regarding leasing opportunities should be made accessible to school superintendants and district technology coordinators.

Encourage schools and libraries to share resources whenever possible.

Within a town, the library particularly can save money by sharing Internet access costs with the schools, while schools may benefit, improving access for their students to all the resources of the local public libraries - including the human resources.

Work with local universities and businesses to expand Internet access.

Sharing access costs can bring the school and library costs closer to wholesale rates.

Develop partnerships with vocational schools and universities to provide teacher training and technology support in areas related to the operation and support of equipment.

This is an area ripe for local experimentation and initiative.

Continue to build public-private partnerships .

New Jersey enjoys a depth of business expertise and companies that can provide direct and indirect funding support to education and libraries. Every effort should be made to maximize these resources.

Make continual training of administrators and staff the highest priority.

Educators need ongoing training to ensure that they and their students make the most advantangous use of technology.

Build for tomorrow.

Put an infrastructure (including power, networking and building modification) in place that will serve as the long term foundations for growth.

Commit to quality.

Any compromise in product procurement or personnel training will result in significantly

BEST COPY AVAILABLE

increased long-term costs.

Be realistic about how much effort is involved in reorienting schools and libraries towards networked education and lifelong learning.

Recognize that the need to upgrade physical facilities, provide teacher training, and integrate the technology into curricula may prevent some schools and libraries from purchasing all systems within a five year period, as this plan proposes.

Be realistic about the rate of technological change and the impact of change on ongoing costs.

Long-term technology plans for schools and libraries should include the cost of replacing equipment periodically to keep it up-to-date. Schools and libraries may need to replace computers every five years, creating a need for predictable long-term funding.

Solicit resident comment at all stages of program planning and implementation.

Long-term funding can only be assured with the knowledge and understanding of the state's residents, Department of Education, the New Jersey Library Association, and Parent Teacher Organizations.

Conclusion

Come with me for a moment to a school where every classroom has a full complement of computers that students -- starting in kindergarten -- use with confidence as an integrated part of their learning. A school where parents can call every night to find out by voice mail what their children's homework assignments are for that evening. A school whose faculty is as engaged and excited about increasing their own knowledge as the students are about pursuing their education. We have schools like this in New Jersey. I've visited them.

Governor Chistine Todd Whitman
January 11, 1997 to the New Jersey State Legislature
State of the State Address

This report seeks to provide a road map that can make Governor Whitman's vision real for every New Jersey student and family. The detailed cost model set forth herein would provide computers for every public library and one computer for every five students, as well as distance and computer networked learning opportunities. It should assist stakeholders in developing technology plans by defining the individual elements and decisions that comprise such plans.

The Ratepayer Advocate also recommends that the State designate a coordinator or coordinators to insure that the New Jersey takes advantage of all possible technology funding and cost-reduction opportunities. Examples of such opportunities are presented. Furthermore, the report urges all stakeholders to create new partnerships among K-12 schools, the higher education community, vocational schools and private industry to reduce the costs of implementing school and library technology plans. This report also emphasizes the need to coordinate purchasing and leasing among several schools to obtain the greatest discount possible.

The report is especially timely in light of the fact that the 1996 Act requires telecommunications providers to provide services to schools and public libraries at a discounted rate. Technology plans cannot be implemented in the absence of rates that are affordable for schools and libraries.

Finally, it should be emphasized that the State has made great strides within the past two years to assure that all students have access to advanced telecommunications resources. By taking advantage of existing funds and using creative strategies to fund networked learning in schools and libraries, the State can take the final steps towards developing equitable access to information and education resources for all New Jersey schools, libraries and residents.

The Ratepayer Advocate would like to express her appreciation to the staff that contributed their efforts and talents to this document with special appreciation for the efforts of Mally Baumel Becker, Esq. and to:

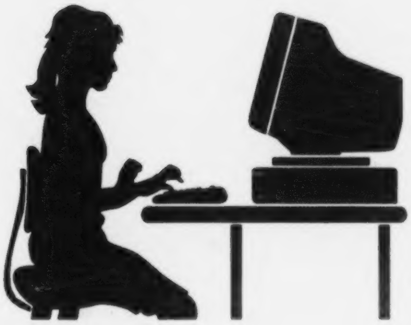
Heikki Leesment, Esq. Managing Attorney,
Telecommunications

Lawanda Gilbert, Esq. Asst. Deputy Ratepayer Advocate

Heidi Angelkorte, Legislative Liason

Peggy Clemons, Support Staff

(Revised 9/9/97)



Appendix A

Assumptions

Some assumptions made in developing this plan were based on demographic data; other assumptions have their foundation in existing or proposed legislation or the evolution of technology.

In addition, the model described herein was developed with the understanding that technology is only an adjunct to existing education and library programs, and that technology should only be adopted when it is cost effective and enhances education.

Core assumptions for this study include:

1. The total costs are based on a five-year technology plan. Both initial equipment costs and ongoing operational and support costs during these five years are represented.
2. At the end of this five-year period, there will be one Internet capable, multi-media computer for every five students and one for each two teachers in all public K-12 schools throughout the state; in addition there will be an average of six computers per public library;[1]
3. All costs are in current dollars, representing systems that are commercially available today. Future costs are not discounted.
4. Although the mix of technology based products and supporting applications and services may differ by grade, an equal amount of money will be invested per student regardless of grade.
5. The cost models are based on statewide averages of schools, district, classroom and library sizes.
6. Training of school administrators and staff, as well as library administrators and staff will remain an extremely high priority throughout the planning period and beyond, as it is recognized that the absence of a well trained staff will compromise the ability to fully integrate all aspects of the available technologies into the school curriculum, and to maximize library access to the Internet. Without adequate training for teachers and librarians, the full promise of networked education will be significantly hindered.

---

[1] School systems and libraries may prefer to implement these systems over a number of years. The need to upgrade physical facilities, provide teacher training, and integrate the technology into curricula may prevent schools and libraries from purchasing all systems immediately.

7. All K-12 schools and public libraries will have the capability of connecting to broadband telecommunication services by the year 2000;

8. All K-12 schools and public libraries will be eligible for discounts for interconnection services either through a federal universal service mechanism and/or a state federal universal service fund.

9. Funding programs and levels for technology and its necessary support functions will be adequate and sustainable to support the previously noted goals;

10. Funding for technology will be obtained from multiple federal, state, and local government sources, as well as civic organizations, foundations, private individuals and business[2];

11. Every effort will be made to assure that any necessary additions for the provision of electrical power to service the technology equipment will be made in a timely and most cost effective manner;

12. County technology centers will be in place to train school and library personnel;

13. Not included in this plan are: building modifications (including new electrical power systems) or special furniture, products or services for administration, equipment and services not directly related to computer or distance learning, equipment replacement and upgrades beyond five years.

A detailed discussion of the assumptions used for this study follows.

---

[2] It is assumed that New Jersey will receive its proportional share (based on the number of students) of funding from the recently proposed and revised Telecommunications Universal Service Fund (part of the 1996 Telecommunications Act), and the Federal Technology Challenge Grant funds. It is also assumed that the BPU will approve discounted rates under tariffs for schools and libraries.

Technology and Infrastructure Assumptions

I. The following products will be capable of being connected to the school network and used for both local and distance learning programs

1. computers and printers
2. TVs and VCRs
3. telephone and facsimile machines
4. camcorders and TV cameras
5. security systems (the cost of a security system is not included in this plan although capable of making use of the category 5 structured cabling system)
6. The need to connect the computers, telephones, facsimile machines, televisions and any other networked equipment will require a minimum of eight telecommunication outlets per classroom to assure that all equipment can be fully utilized in a safe and educationally conducive environment.
7. The technology (media) center will have 20 communication outlets
8. The library will have 10 communication outlets to support the installed equipment plus allow the use of portable laptops
9. Administration areas will have 2 connections per room

II. There will be a minimum of one electrical outlet for each communications outlet to assure that all equipment can be safely connected to its power source (additional cost, if necessary, is not included in this study)

1. New construction will install sufficient conduits within the walls and ceilings to provide capacity for all envisioned communications cabling (additional cost, if necessary, is not included in this study)
2. Existing asbestos abatement programs and regulations will be adhered to in all work related to the positioning of all technologies and support services (additional costs, if necessary, are not included in this study)
3. Quality products will be obtained with the objective of minimizing the life time total cost of the system.
4. This study does not make provision for the use of networked computers or other networked equipment on school property which is outside the confines of the physical school building.
5. Wireless data transmission systems with on-premises transmitters are suggested only for those schools and libraries that have significant physical building obstacles to overcome (e.g. asbestos, inability to run wire). Wireless data transmission is not being recommended at this time as a general replacement for wired systems due to its lower data transmission rates and higher costs then equivalent wired systems. Wireless telephones can be used in lieu of wired telephones, where appropriate to support a school program.

6. The role of computer servers will be to manage all academic functions including: storage and distribution of all academic software
    1. electronic mail between the school and home computers
    2. video broadcast routings
    3. control and access to the Internet
    4. voice mail support
    5. storage of lesson plans on a daily basis
    6. distance learning administration

    Hubs, routers, concentrators and modems will be purchased by the individual school districts, not provided by the telecommunications provider(s)
7. Transmission rates are:
    POTS = 28.8 kbps
    ISDN = 128 kbps
    - Coaxial cable = 500 kbps
    - T-1 = 1.5 mbps
    - T-3 = 45 mbps
    - ATM = 155 mbps
    - Private line switched digital service can be obtained at 56,64,128 and 384 mbps
    - ADSL can transmit 1.5 mbps over short distances
    - Category 5 cable (certified) can transmit 155 mbps
    - Premises wireless LANs can transmit 2 mbps
    - Basic rate digital ISDN can carry 3 communication channels
    - Primary rate ISDN can carry 23 communication channels

Assumptions Regarding the State of New Jersey

The majority of schools and libraries appear to have an insufficient quantity of properly positioned electrical outlets to support all the suggested technology products.

1. The NJ DOE, in conjunction with the State facility planners and input from local school districts should work to assure that sufficient resources are allocated to remedy this situation where necessary, and make every attempt to assure that the work is completed prior to the installation of the specified technology products.
2. Whenever possible building modifications related to power, communication and environmental conditions should take potential future technology applications into account; installation of the necessary power and communications cabling however may best be installed in phases, although all necessary conduits will be installed initially.
3. Although the mix of technology based products and supporting applications and services may differ by grade, it is anticipated that an equal amount of money will be invested per student regardless of grade.

4. Discounted rates under tariffs for schools and libraries are expected to be approved by the BPU.
5. It is anticipated that all schools and libraries will have access to broadband services by the year 2000.
6. Formal paid for technology training will need to average a minimum of 5 days per year per teacher and librarian, and 2 days per year per administrator. An additional 6 days per year of informal peer-peer training is anticipated.
7 To minimize total life cycle costs it is suggested that all equipment will be insured against loss.
8 It would be in the best interests of all schools and libraries to have county technology training centers available for information sharing.

G. Assumptions Regarding Local School District Responsibilities:

With the objective of minimizing the total cost of implementing a technology program each District should be encouraged to determine the best use of technology for its needs and determine the best means of integrating technology into the education curriculum. Among the responsibilities that are and should remain with the local school district are the following:

1 Obtain access to a Technology Coordinator. The manner in which this would be accomplished is best left to the individual district. Among the options which may be considered would be use of an individual already on the staff, by the sharing of resources with another District, or by requesting volunteers from among the local citizens.
2 Assure that the previously developed asbestos abatement program report is available to be used as a reference during the running of any cables that require the opening of walls or ceilings.
3 Whereever possible, attempt to install technology services (e.g. communications, power) in conjunction with other planned construction.
4 Maintenance of an inventory of all technology products, their condition, age and maintenance records.
5 Making the best possible effort to assure that the facilities used for computer applications and distance learning are safe and offer a conducive learning environment.
6 Specifying and providing the appropriate type and quantity of equipment to each grade.

Appendix B

Educational Telecommunications Online in New Jersey

(The following section is reprinted from Hezel Associates, *Educational Telecommunications: The State by State Analysis, 1996-97.* Copyright, 1996, Hezel Associates. Reprinted with permission from the publisher.)

Key Planners
New Jersey Network (NJN)
New Jersey Department of Education (NJDOE)
New Jersey Intercampus Network (NJIN)
Office of Telecommunications and Information Systems (OTIS)

Recent Developments

In November 1996, Governor Whitman signed into law the Educational Technology Teacher Training Act, which establishes within the Department of Education the "Educational Technology Teacher Training Fund." Grants provided from the fund will be used for the development of at least 21 regional centers to train teachers in high-tech skills to enhance their knowledge of technology, as well as for the acquisition of equipment needed for that technology training. The centers will offer the latest technology for teaching school district teams, which then will train local staff. The legislation provides grants of up to $200,000 per site, with a phase-in timetable that provides for at least seven sites to be established in the first year of the program.

In 1995, the New Jersey Department of Education (DOE) proposed the Strategic Plan for Systemic Improvement of Education in New Jersey to coordinate the uses of technology in education and information management. The framework includes the following strategies: 1) work with state agencies, professional organizations, higher education institutions, business and industry, and the New Jersey Statewide Systemic Initiative (NJ/SSI) to implement *Educational Technology in New Jersey: A Plan for Action* and the recommendations of the Ad Hoc Council for Technology; 2) make DOE information available on-line to schools statewide by implementing database, networking, and communications technology at DOE; 3)expand the use of technology to support the public information process, particularly fiscal monitoring and reporting; and 4)continue and expand the ongoing grant program for the establishment of interactive full-motion distance learning sites.

In April 1995, in conjunction with efforts by the Governor to examine the emerging competitive landscape within the telecommunications industry, the New Jersey Board of Public Utilities (BPU) initiated the formation of the the Cable/Telco Task Force, consisting of representatives from both public and private sectors. The vision of the Task Force was to: examine the emerging competitive landscape and recommend policies to foster free and open competition on a nondiscrimatory basis that will enhance New Jersey's leadership role in the field of telecommunications and promote economic development and other benefits that are in the public interest."

The Task Force focused on the review of key policy areas through six subcommittees: Legislation and Regulation, Deployment and Interconnection, Health Care, Education, Consumer Issues, and Universal Service. The Director of the Division of the Ratepayer Advocate, Blossom A. Peretz, served as the Chairperson of the Education Subcommittee, which had representatives from AT&T, Bell Atlantic-New Jersey, New Jersey Network, New Jersey Cable Telecommunications Association (NJCTA), as well as assistance from the New Jersey Department of Education and the New Jersey Library Association. The Subcommittee presented a Phase I report consisting of a survey of the existing educational techonology initiatives, and recommendations to promote affordable access to the information network for schools, libraries and museums and to assist in the depployment of advanced service capabilities of a modern telecommunica- tions infrastructure throughout the state.

In April 1995, the Board of Public Utilities (BPU) approved county and regional rates filed by Bell Atlantic for Interactive Distance Learning Service (IDLS). This is the first interactive distance education tariff in the nation. The service consists of one transmit and three receive audio and video paths which allow sites to interact with other sites either within their community of interest or Local Access and Transport Area (LATA). The system provides four locations, one classroom sending and three receiving, working together over the network. Rates are limited to public and private educational institutions, libraries, cultural institutions, and non-profit organizations using the system for distance learning. The monthly five-year, term-based rates for one transmit, three receives are $1,050 (countywide) and $1,350 (LATA wide) with rates of $995 and $1,295, respectively, for districts with special needs.

Seven county-wide distance learning programs that provide live, full-motion courses to students and teachers over fiber optic cable have signed contracts with Bell Atlantic of New Jersey. Several other counties plan to establish similar networks.

The New Jersey Association for Instructional Technology (NJAIT) has been established from counties that have in place or are building county networks. The purpose of NJAIT is to explore and advocate for the effective use of instructional technology for distance learning in counties, and to address infrastructure issues related to instructional TV.

Bergen, Morris, Hudson, Burlington, Somerset, Mercer, and Union counties have established distance learning programs that deliver live, full-motion courses to students and teachers over fiber optic cable. Several other counties have similar plans. The Vocational-Technical Schools of Warren, Sussex, and Morris Counties are linking for distance learning.

The Commission on Business Efficiency of the Public Schools - Education Technology Task Force has been organized by state legislators to propose educational technology policy recommendations to be presented to the state legislators.

The new AT&T Learning Network is a $150 million nationwide commitment to education. As part of this, AT&T will offer private and public schools in New Jersey access to a wide variety of telecommunication services by the year 2000.

Assembly Bill A1860, introduced in April 1996, requests funds for competitive grants to establish multiple training sites.

Statewide and Local Planning

The New Jersey Telecommunications Act of 1992 enabled the New Jersey Board of Regulatory Commissioners to act upon alternate methods of telephone utility regulation. Under incentive regulation legislation, Bell Atlantic of New Jersey filed its Opportunity New Jersey plan for the modernization of New Jersey's infrastructure. This $1.5 billion initiative explores ways in which fiber optics, digital switching, and other technologies can be applied to health and human services, government, industry, and education.

Statewide and Local Networks

The New Jersey Network (NJN), a founding member and partner with NJDOE in the Satellite Educational Resources Consortium (SERC), is the public television network for New Jersey. NJN offers telecourses for K-12, college, and adult students. Through a partnership with New Jersey colleges, NJN participates in the "Going the Distance" program which allows certain students to complete 2-year degrees entirely from NJN telecourse broadcasts. NJN also provides the PBS Mathline which includes the Middle School Math Project (MSMP) for professional development of middle-grade math teachers.

New Jersey Public Broadcasting uses broadcast, ITFS, satellite, cable, and fiber optic technologies to offer instruction throughout the state. Each semester NJN broadcasts 15 college telecourses from participating institutions in New Jersey, Delaware, New York, and Pennsylvania. In addition, NJN delivers over 100 K-12 instructional programs each year.

The New Jersey Intercampus Network (NJIN) operates a three-phase plan for the development of an intercampus network that will augment the receive-only satellite down-links existing on many New Jersey campuses. Phase one began in 1994 with the connection of the New Jersey Institute of Technology (NJIT) to William Paterson College. This phase has recently been completed with the linkage of William Paterson College to Richard Stockton State College. NJIT is now in phase two of the NJIN plan to connect higher education institutions to critical areas of the state via a two-way, primarily digital video network, using two-way videoconferencing. Phase three will add channels and institutions to the system. NJIN evaluates, selects, and purchases equipment for 39 colleges and universities. This equipment will enable New Jersey colleges to exchange courseware with each other, pre-college programs, and corporations. As the first stage of this statewide effort, NJIN has begun implementing a videoconferencing delivery system, a two-way video and audio data exchange over phone lines between Newark and the Technology and Engineering Center (a branch campus in the south) and between Newark and Ramapo College in the north.

NJN and NJIN have exchanged memberships and will collaborate in future activities.

The Cable Television Network (CTN)of New Jersey, Inc. a statewide channel owned by the state's cable television industry, reaches more than 1.7 million households and offers 60 half-hour blocks of for-credit programming from 17 institutions of higher education each week. CTN broadcasts telecourses for participating colleges and universities.

Two examples of the seven Instructional Television (ITV) county projects in New Jersey are the networks in Bergen and Hudson Counties. The non-profit, fully interactive Bergen ITV fiber optic network, coordinated by Bergen County Technical School and funded by local schools, was established in 1990. Schools share programs whose course content is determined by the schools. The network has added middle and elementary schools through state grant money.

Bergen County has received a class B Internet license housed at Bergen County Technical School (BCTS) which plans to deliver Internet access to the county schools. BCTS participates in the North Jersey Public Information Exchange, initially a freenet and now a community network which includes the North Public Library, Elizabeth Public Library, Bergen County Technical School, Bergen County Cooperative Library Services (BCCLES), Elizabeth Public Schools, and the Morris Automated Information Network. Bergen County Technical School's highest priority for action in 1996 is to bring Internet access to all county schools and interface data with other audio and video distance learning projects.

Bergen Community College and Ramapo College of New Jersey are connected by fiber to the Bergen County Instructional Television Network for two-way interactive instructional programs. NJIT has an ITFS link to this network.

The ITV network continues to grow in Hudson County. Members are discussing a county-wide data network, which may become a county-wide web site on the Internet rather than a separate network specifically for a geographic area. The question is one of justification to build a separate network or provide access to the Internet. In New Jersey there is an initiative to put the Internet into all classrooms, but the infrastructure to gain Internet access still must be installed. Hudson County School of Technology is currently providing 20 staff members with Internet accounts, with the expectation that these people will make recommendations for curriculum positions for integrating the Internet into the curriculum. There are also seven colleges in Hudson County that are ITV members.

Hudson County School of Technology is installing its first ISDN. ATM is not yet in use. Microwave, satellite, and fiber are all in use in Hudson County. In the coming year, Hudson County School of Technology plans to complete all existing locations of ITV, to build a more content-rich environment, get more classes, programming, and more activities in general over ITV.

One of the classroom locations of the ITV network of Hudson County is the University of Medicine and Dentistry of New Jersey. The university is the allied health training facility for the state and its focus is on allied health programs in vocational schools and hospitals. One of ITV's goals is to bring hospitals into the network.

The governing body of Hudson County has bonded funds to pay for an ITV class in every high school in the county, several colleges, and government locations. County bonds pay for all hardware to put each classroom on the network and the institution signs a five-year network contract. There are now 17 schools on the network with 13 locations to be added during 1996. A search is on for corporate involvement.

CamNet, an interactive system linking Camden County schools to Camden County Library resources and to worldwide databases, is an Ethernet WAN with its center on the library's Digital computer system. It is connected via a Garden State Cable TV broadband network to the schools. A T-1 line provides access to the World Wide Web and other Internet resources. CamNet is available for both teacher and student use.

K-12

During 1994 Bell Atlantic began the Opportunity New Jersey Grant program which, in partnership with the New Jersey Association of Superintendents and Administrators (NJASA), awards grants to K-12 institutions that develop significant models that integrate and use technology in accomplishing their educational objectives. The project is establishing a successful model that can be shared throughout New Jersey and the nation.

The New Jersey Statewide Systemic Initiative (NJ/SSI) is a new partnership formed to achieve excellence in mathematics, science, and technology education statewide. The eight primary activities of the program include DOE's *Educational Technology in New Jersey: A Plan for Action* and an in depth, school-based initiative for fundamental, structural reform to be adapted and implemented throughout the state. As of December 1995 approximately 500 schools and 14 school districts are actively in partnership with institutional sites such as NJDOE, County College of Morris, Education and Informational Resource Center (EIRC), Fairleigh Dickinson University (FDU), Kean College, Liberty Science Center, Merck Institute for Science Education, Montclair State University, NJIT, New Jersey Marine Sciences Consortium, Rowan University, Rutgers University, Seton Hall University, Stevens Institute of Technology, and Trenton State College.

As of December 1995 there were 108 K-12 school districts with satellite-fed distance learning capability. This was a result of the partnership of NJDOE and NJN in the Satellite Educational Resources Consortium (SERC). Districts have installed additional satellite dishes. Professional development courses in math/science/technology will be offered free-of-charge during 1995-96 through funding by NJDOE.

NJN broadcasts 25 hours per week of K-12 instructional programming through its statewide television broadcast network. Over 35,000 NJN Educational Resource Guides are distributed annually to New Jersey schools.

Funding

The NJDOE has developed a "Comprehensive Plan for Educational Improvement and Financing.". A goal of New Jersey's budget for fiscal year 1996 is to expand equal educational opportunities to all students in the state. The state has put more money into "special needs" districts and is cutting aid to districts that spend more than 30 percent in excess of the median for administration. The state is giving monetary incentives to districts that realize the cost savings through consolidation and regionalization. The New Jersey FY 1997 budget recommendation includes $10 million for school district technology grants. Through this funding, each school district receives an entitlement of set per-pupil amount ($8.50) in non-lapsing but dedicated funds to be used for the purchase of software and hardware and for retrofitting of school facilities for access to voice, video, and data transmission that facilitate information retrieval, telecommunications, multimedia, interactive distance learning and home/school linkages.

NJIN, the distance learning coordinator for higher education, is administering a $7.5 million Equipment Leasing Fund (ELF) from the New Jersey Commission on Higher Education and $400,000 from the legislature to provide NJIN institutions with video classroom facilities and multimedia workstations for distance learning. The $400,000 is used to provide staffing, training programs, to help implement and continue planning for statewide networking, and to help purchase equipment through ELF. The $400,000 is also used for NJIN collaborative efforts with K-12, industry, state government, and state library. NJIN anticipates becoming the focal point for collaboration on networking for education in New Jersey.

New Jersey has appropriated $500,000 for fiscal year 1995 and $800,000 for fiscal year 1996 for educational technology initiatives in distance learning. From 1995 through June 1996 the DOE's Classrooms Connections to the Future program awarded 11 grants for unique distance learning projects for grades 3 to adult. New funding for fiscal year 1996 includes nine $35,000 regional awards for classrooms located in each LATA; a $75,000 award to a distance learning demonstration site and resource center; and a $150,000 award to each of two educational technology consortia with at least one urban special needs district and at least one district with a district factor grouping of "I" or "J" for educational technology initiatives, including joint distance learning projects.

New Jersey has received $2.9 million over 36 months from NSF to develop Internet activities. As part of the statewide systemic reform in science, mathematics, and technology for K-12, the Networking Infrastructure for Education (NIE) test-bed has been formed with the goal of providing an infrastructure of high quality content that can be captured and shared electronically throughout the state. DOE's *Educational Technology in New Jersey: A Plan for Action* guides NIE activities, the ultimate goal being to provide an infrastructure of high quality content that can be captured and shared electronically throughout New Jersey. NJIN, as part of a very successful effort in K-12, receives $150,000 per year to run Internet training programs, help develop curriculum, and run connectivity seminars.

The Mercer County consortium (MercerNet), with $700,000 of a $2. 6 million award from the U.S. Department of Commerce's Telecommunications Information Infrastructure Assistance program, is beginning to establish an interactive video classroom at Mercer County Community College, each county library branch, the Invention Factory Science Center in Trenton, and at one high school in each Mercer County district.

Bell Atlantic has provided technology grants to eight schools in the Newark School District and, in partnership with the Newark Board of Education and Research for Better Schools, has been successful in two NTIA grant applications. Through grants awarded through Bell Atlantic - New Jersey's Opportunity New Jersey School Grant Program during 1995, 11 recipients developed high speed networks for information sharing and prepared collaborative models for learning with schools throughout the nation.

NJ/SSI activities are supported by an annual $2 million award to New Jersey from the National Science Foundation (NSF) for 1994-99, matched by $ 1 million per year from the state.

This report, "Educational Technology Funding for K-12 Schools: A State Analysis" was prepared by Hezel Associates of Syracuse, NY in support of The Integrated Technology Education Group, of Short Hills, NJ (November 1996) for submittal to the New Jersey Division of the Rate Payer Advocate

Proposed State Legislation

A-1860: ASSEMBLYMAN DAVID WOLFE (R) AND ASSEMBLYMAN JOHN ROCCO (R)

Summary:

Establishes the Educational Technology Grant Program in the Department of Education. The purpose of the program is to provide grants to school districts for the funding of five year technology plans. A grant would be in the amount of $80 per pupil per year and would be paid to a district for five years. An application for a grant to fund a five year plan shall be submitted by a school district under the grant program would be placed in a special revenue fund. An Education Technology Advisory Council would be established within the Department of Education. The council would assist the Office of Technology as it develops the process for the evaluation of applications for grants under the program.

Status: ASSEMBLY EDUCATION COMMITTEE

The bill was introduced, first reading in the Assembly on May 2, 1996 and referred to the Assembly Education Committee.

A-1926: ASSEMBLYMAN DAVID WOLFE (R) AND ASSEMBLYMAN JIM HOLZAPFEL (R)

Summary:

This bill requires that, beginning in the 2000-2001 school year, candidates for teaching certification and persons seeking certification through the alternate route successfully complete a technology training program. A "technology training program" is defined as a course of instruction which increases proficiency in the understanding, use and application of educational technologies within the classroom. This bill is a recommendation of the Educational Technology Task Force. The task force, in its report, noted that it was imperative for all New Jersey students to have technological resources available to them so that they will be able to compete successfully in the workforce of the 21st century. In order to accomplish this, teachers will need to understand the potential of technology to support curriculum goals.

Status: ASSEMBLY EDUCATION COMMITTEE

The bill was introduced, first reading in the Assembly on May 6, 1996 and referred to the Assembly Education Committee.

S-796: SENATOR JOSEPH BUBBA (R)

Summary:

This bill establishes in the Department of Education the "Educational Technology Fund." The fund would be used to provide local school districts an annual entitlement of $50 per pupil for the training, instruction and use of technology in the educational process. Moneys for the fund would be derived from the repayment of loans and interest in the "Public Schools Facilities Loan Assistance Fund," and from the sales, grants, leases, and rentals of lands received by the "Fund for the Support of Free Public Schools." In addition, the bill requires the Department of Education to distribute information on successful projects to other school districts.

Status: SENATE EDUCATION COMMITTEE

The bill was introduced, first reading in the Senate on February 15, 1996 and referred to the Senate Education Committee.

S-40: SENATOR BOB MARTIN (R) and SENATOR JACK EWING (R)
A-20:ASSEMBLYMAN GARY STUHLTRAGER (R) and ASSEMBLYMAN JOHN ROCCO (R)

Summary:

The "Comprehensive Educational Improvement and Financing Act of 1996." Legislation that would overhaul New Jersey's current school funding formula. Distance Learning Network Aid $50 million has been included in this measure. Ten million dollars was included in the 1996-97 budget for the purpose of providing to districts a per-pupil allocation of seed money to purchase whatever the districts need to become technologically current. For 1997-98, it is recommenced that $50 million be included to establish a Distance Learning Network.

Status: ASSEMBLY EDUCATION AND SENATE BUDGET & APPROPRIATIONS COMMITTEES

The bill, **A-20**, was introduced, first reading in the Assembly on July 18, 1996 and referred to the Assembly Education Committee and will be heard on December 5, 1996. The bill, **S-40**, was introduced, first reading in the Senate on June 27, 1996 and referred to the Senate Education Committee. On November 25, 1996 it was reported out of committee by committee substitute, second reading and referred to the Senate Budget and Appropriations Committee.

S-1467: SENATOR BILL SCHLUTER (R) AND SENATOR JACK EWING (R)

Summary:

Revises operations of county educational audiovisual centers and authorizes establishment of regional centers. Recognizing that educational technology has greatly advanced from the 16mm film which was the principal media in the 1950's, the bill renames the centers as instructional media and educational technology service centers. The bill would permit the consolidation of these centers by providing the authority for two or more county centers to merge to form a regional center, and the authority for either a county center or a regional center to merge with an existing shared services organization. Core lending services would be structured as assessments against the participating school districts on the basis of resident pupil enrollment as under existing law, and other services could be structured as a direct charge for contractually defined services.

Status: SENATE EDUCATION COMMITTEE

The bill was introduced, first reading in the Senate on September 19, 1996 and referred to the Senate Education Committee.

AR-32: ASSEMBLYMAN KEN ZISA (D) AND ASSEMBLYWOMAN LORETTA WEINBERG (D)

Summary:

This resolution urges the State Board of Education to petition the Board of Public Utilities to undertake a review of the utility rates charged to public school districts and adopt a special rate schedule of lower utility rates for school districts.

Status: ASSEMBLY EDUCATION COMMITTEE

This bill introduced, first reading in the Assembly on January 11, 1996 and referred to the Assembly Education Committee.

New Jersey Public Schools - Estimated Technology Cost

Based on State-wide average school size

Equipment Costs	$ Each	basis	Qty in Media Ctr	Qty in Library	Qty in Other Rms	Admin	Units per School	Cost/School Year 1	Cost/School 5 Years	Category Cost 5 Years	
Computer Equipment										$ 346,125	
Desktop PC (including monitor)	$ 2,000	fixed	12	5	93		110	$ 220,000	$ 220,000		
Laptop PC (B&W, with docking station)	2,500	fixed	5		7		12	30,000	30,000		
Color Monitor (for laptop)	400	fixed	5		7		12	4,800	4,800		
Application Software, per computer	200	fixed	17	5	100		122	24,400	24,400		license and individual
Computer protection equipment	75	fixed	17	5	100		122	9,150	9,150		
Speakers/Headsets	25	fixed	5	6	8		19	475	475		
Printer (laser)	1,000	fixed	1	1			2	2,000	2,000		printer ratio is 1 per 5 computers
Printer (color)	600	fixed			2		2	1,200	1,200		
Printer (inkjet or dot matrix)	300	fixed	3	1	17		21	6,300	6,300		
Scanner	800	fixed	1				1	800	800		
Server computer (files, e-mail, web)	8,000	fixed					2	16,000	16,000		
PC projector (classroom)	3,500	fixed	1	1	1		3	10,500	10,500		
Spc equipment for content areas	14,500	fixed			1		1	14,500	14,500		art, science, music, spc educ
Other equipment ($200 per room)	200	fixed			30		30	6,000	6,000		calculators/barcode reader/control units
Distance Learning Equipment										83,850	
Video Conference (avg)	65,000	fixed	0.25				0.25	16,250	16,250		avg based on one FMV sys /district in 5 yrs
Transportable distance learning unit	32,000	fixed	0.25				0.25	8,000	8,000		based on one per district
Combined video/computer projector - large room	6,000	fixed			0.50		1	3,000	3,000		auditorium or large room use
Fax with Telephone	300	fixed	1	1			2	600	600		
Telephone (half conference phones)	100	fixed		1	32		33	3,300	3,300		
Audio Conference System	700	fixed	1				1	700	700		
VCR/Laser Disk Player	500	fixed	1	1			2	1,000	1,000		
TV (2 24-inch or 1 31-inch)	600	fixed		2	8		10	6,000	6,000		
Subject Matter Content/year	8,600	annual					1	8,600	43,000		cost/school < 20% total value
Digital Camera & camcorder	2,000	fixed	1				1	2,000	2,000		
In-School Network										39,220	
LAN wiring and installation	130	fixed	20	10	180	8	218	28,340	28,340		20 jacks in MC, 10 in libr, 6/CR, 2 in other rooms
LAN hub ($80/port)	80	fixed	16	6	90	4	116	9,280	9,280		
Coaxial cabling	200	fixed	1	1	6		8	1,600	1,600		
District Network										32,132	
District link fixed cost, average	5,732	fixed					1	5,732	5,732		
District link recurring cost, average	5,280	annual					1	5,280	26,400		
Internet Connection										27,810	
District Internet connection (T1)	6,239	fixed					0.25	1,560	1,560		
District Internet, recurring (T1)	21,000	annual					0.25	5,250	26,250		
Telephone system-on premises										31,200	
Telephone switching system	600	fixed	2	2	33	15	52	31,200	31,200		cost per port telephone outlet
Training										137,500	
Staff Training	27,500	annual					1	27,500	137,500		$53 x 519 students/school
Support										377,814	
Repair & Warranty (8% of equip. cost)	31,646	annual					1	31,646	158,230		starts year 2, therefore 8% used
Supplies ($20/student)	20	annual					515	10,307	51,534		
Technology Director	50,000	annual					0.25	12,500	62,500		one per district
Technology Coordinator	40,000	annual					0.5	20,000	100,000		two per district
Education Technology Training Center	185,000	annual					0.01	1,850	5,550		one per county = 1 per 110 schools
Total Per School Cost:								$ 587,620	$ 1,075,652		
Total Computer, Distance Learning, Other Equipment								$ 395,575	$ 429,975		
Total items subject to educational discount								$ 375,675	$ 375,675		
Total network costs (incl. telephone system)								$ 88,242	$ 130,362		

Note: other equipment includes: calculators, bar code readers, computer backup unit, overhead projectors, cd rom players, wireless phones for campus use

(Revised 9/9/97)

BEST COPY AVAILABLE

New Jersey Public Libraries - Estimated Technology Cost

DRAFT for NJ RPA			Average library equiv					
Equipment	$ Each	basis	Qty in Library	Units per Library	ost per Libra Year 1	st per Libra 5 Years	Category Cost 5 Years	
Computer System							20,550	
Desktop PC (including monitor)	2,000	fixed	6	6	12,000	12,000		
Application Software, per computer	200	fixed	6	6	1,200	1,200		license and individual
Server computer (small system)	5,000	fixed	1	1	5,000	5,000		
Computer protection equipment	75	fixed	6	6	450	450		
Speakers/Headsets	25	fixed	4	4	100	100		
Printer (laser)	1,000	fixed	1	1	1,000	1,000		
Scanner	800	fixed	1	1	800	800		
In-Library Network							3,360	
LAN (incl premises cabling)	130	fixed	16	16	2,080	2,080		
LAN hub ($80/port)	80	fixed	16	16	1,280	1,280		
District Network							32,132	
District link fixed cost, average	5,732	fixed		1	5,732	5,732		
District link recurring cost, average	5,280	annual		1	5,280	26,400		
Internet Connection							921	Shared Internet cost scaled to porportional size of computer systems
District Internet connection (T1)	8,239	fixed		0.01	52	52		
District Internet, recurring (T1)	21,000	annual		0.01	174	869		
Training							15,413	
Staff Training	3,083	annual		1	3,083	15,413		15% of asset cost per year=~5days formal trng/year
Support							57,220	
Repair & Warranty (8% of equip. cost)	1,644	annual		1	1,644	8,220		starts year 2, therefore 8% used
Supplies	5,000	annual		1	5,000	25,000		
Technology Coordinator	40,000	annual		0.10	4,000	20,000		two per district
Technology Consultant	80,000	annual		0.01	800	4,000		one per county = 1 per 110 schools
Total Per Library Cost:					49,674	129,596		
Total Computer Equipment					20,550	20,550		

BEST COPY AVAILABLE

Cost Analysis

Cost Model Assumptions	
Number of students: Pre-K through 12	1 195 729
Number of students: K through 12	1 185 323
Number of students: 1 through 12	1 091 606
Average K-12 students per school	515
Average teachers per school	37
Average rooms per school	35
Average schools per district	4
Total public schools in New Jersey	2 300
Days per school year	180
Target computers per school	122
(Based on 5:1 student plus 2:1 teacher allocation)	
Total libraries in New Jersey	400
Average population served per library	19,575
Target computers per library	6
(Based on 1 plus 1:4000:1 population allocation)	
Fraction of district computers in libraries	0.8%
Districts able to use cable I-net for networking	20%

Per School Cost Summary	5-Year Cost ($)	
Computer Equipment	346,125	32%
Distance Learning Equipment	83,850	8%
In-School Network	38,220	4%
District Network	32,132	3%
Internet Connection	27,810	3%
Telephone system-on premises	31,200	3%
Training	137,800	13%
Support	377,814	35%
Total	1,075,652	100%

Per Library Cost Summary	5-Year Cost ($)	
Computer System	20,880	16%
In-Library Network	3,380	3%
District Network	32,132	25%
Internet Connection	821	1%
Training	15,413	12%
Support	57,220	44%
Total	129,846	100%

Total Public Schools Cost, Five Years	$2,476,149,979
Total Public Schools Cost, per year	$495,229,996
Per Student Cost, per year	$417
Total Public Libraries Cost, Five Years	$51,838,362
Total Public Libraries Cost, per year	$10,367,672
Per Population Cost, per year	$1.32

Funding Analysis

	1-Year Cost ($)	5-Year Cost ($)
Results from cost model:		
Total Per School Cost	587,620	1,075,652
Total Computer, Distance Learning, Other Equipment	385,575	429,975
Total items subject to educational discount	375,675	375,675
Total network costs (incl. telephone system)	88,242	130,382

Public Schools			
first year cost/school	$587,620		
5 yr cost/school		1,075,652	
cost per student day ($)		2.32	
cost per student/year		417.45	
Total cost 5 years	[redacted]	$2,476,149,979	
Minus 20% educ./productive discount		$172,980,770	$43,026 avg donations/school/year
Minus 20% donations/year (incl foundations/fed grants)	$88,045,886	$495,229,996	
Minus 2% residual sale		$49,523,000	
Minus 5% new installed		$123,807,499	
New Money Required-public schools	[redacted]	$1,634,628,715	
Possible mgmt savings		$514,000,000	assumes all saving programs are instated
Assume 50% actual savings		$257,000,000	
New Money Required after savings (100% saving)		$1,120,628,715	
New Money Required after savings (50% saving)	[redacted]	$1,377,628,715	$232 per student/year
Private Schools			
Total Cost 5 years (full complement)	[redacted]	$332,423,135	(75% of public school cost due to smaller private size and salary structure)
Minus 15% educ. productive discount		$14,186,522	
Minus 15% donations/year	$8,972,664	$49,863,470	
Minus 2% residual sale		$6,648,463	
Minus 5% new installed		$16,621,157	
New Money Required for non-public sch	[redacted]	$245,103,523	
Possible mgmt savings		$69,620,000	
New Money Required after savings	[redacted]	$175,483,523	$164 per student/year
Total Cost 5 years (network only)		$23,380,452	
Minus 3% donations/year	$140,283	$701,414	
Minus 5% new installed		$1,169,023	
New Money Required for non-public sch	[redacted]	$21,510,015	
Possible mgmt savings		$2,868,229	
New Money Required after savings	[redacted]	$18,641,786	
Total public and private school cost		$2,808,573,114	
Public and private school new money required		$1,879,732,238	
Public/private school money req'd after 50% mgmt saving		$1,553,112,238	

BEST COPY AVAILABLE

New Jersey Statistics

NEW JERSEY SCHOOL STATISTICS - 1995-1996

Source: Vital Education Statistics

Operating School Districts	594		
Public Schools			
Elementary	1.848		
Secondary	373		
Special	81		
Total	2.302		
Schools per District			
Elementary	3.11		
Secondary	0.63		
Special	0.14		
Total	3.88		
Students			
Elementary w/o pre-k)	842.885		
Elementary (incl pre-k)	852.290		
Secondary	343.439		
Total	1.195.729		
Students per School			
Elementary	461		
Secondary	921		
Average	519		
Staff		**Mean Salaries**	
Full-time teachers	84.831	**$48.751**	
Admin & Supervisors	7.841	**$77.670**	
Ed. Support Services	12.634	**$52.511**	
Teachers per school	37		
Classrooms per school	30		
Students per classroom	17.30		
Teachers per classroom	1.23		
Students per PC (1991-2)	17 4		
Students per PC (1996)	9.5	"modem"	based on QED sample of 1,170 schools
Computers/Printer	4	QED	
LAN Servers per school	2.2	QED	for 481 schools in QED sample
Schools with Internet Access	72%	QED	of 1,170 school sample
TVs/School	12	QED	
TVs/VCR	1.3	QED	
Schools with video conferencing	66%	QED	of 1,170 school sample
Private Schools:			
Total non-public schools	1.055		
Total non-public enrollment	214.000		
Enrollment as fraction of total	15%		
Enrollment as fraction of public	18%		
1995 New Jersey Library Statistics			
Total libraries (with branches)	400		
Total NJ population served	7.830.000		
Average pop. served per library	19.575		
Total circulation	46.000.000		
Average hours open per week	53		
Total expenses	$241.000.000		
Total librarian staff	1.387		
Total staff (FTE)	4.641		
Average libraries per district	0.67		

Appendix D

Revenue and Cost Reduction Initiatives

I. Cost Reduction Opportunities

Tier I Suggestions:

a) Encourage schools and public libraries to jointly plan and utilize local telecommunication facilities. Possible savings are $20 million.

b) Encourage the use of Community Colleges, Vocational Schools and the State University system to develop a program whereby technical students can provide support to K-12 schools for the installation and maintenance of the technology system. Possible savings are $5000 per year per school, for a five year total of $57 million.

c) Develop a program whereby teachers, students, librarians and administrators can pay a portion of the purchase price of the computers, and own the computers after a predefined period of using the equipment on behalf of the schools or libraries. If the split were to be 50-50 for lap top computers only, the savings would amount to approximately $40 million.

d) In the context of a NJ Board of Public Utilities proceeding, seek approval of preferential rates and/or discounted tariff rates with all telecommunication providers for services offered to schools and libraries. Plan assumes a 15% reduction in overall tariff network charges.

e) Develop measurable standards of progress with regard to implementation of the District Technology plan, and adjust allocated State funding in accordance with the annual results obtained. Also tie funding to the District's adherence to the NJ State DOE technology plans, and facilities standards for technology. Potential savings could be $50,000 per district on average or about $30 million.

f) Initiate a technology equipment repair program at various vocational schools throughout the State, and negotiate repair rates. This will reduce costs and provide student training in a growth industry. Possible savings are $17 million.

g) Develop "technology planning partnerships" between school districts with proven, acceptable technology programs and state operated school districts and special needs districts; provide an incentive for the more advanced district to lend its personnel to provide the necessary support. Possible savings would be about $3 million.

h) Each school district may conduct financial analysis of software purchasing versus district licensing. Savings are about $10 million.

i) Limit the referenced technologies provided to Kindergarten students. This reduces the five year capital expenditure by approximately $75 million.

j) Initiate a program of State level purchasing of all technology equipment for use in school or at home; at a minimum support the concept of combined local district equipment purchases. A 15% reduction in cost is anticipated and included in the funding/cost plan.

k) All district technology plans will have a funding section that details first costs, and suggests the method(s) to be used to assure long term self sustaining funding. The formal planning process will reduce costs 1% on average or about $20 million.

l) Actively encourage the use of leasing and lease-purchase options in lieu of product purchase. A life cycle reduction of 2% or about $40 million is anticipated.

m) Establish a school technology loan program in which NJ would define the eligibility requirements for borrowing from the loan pool and set the borrowing terms. A saving of about $10 million is possible.

n) Provide an incentive tax credit for business investment in NJ schools. Donations are included in the plan.

o) Use a mix of long term bonds and serial bonds to better relate the pay back period to the life of the asset(s). A $20 million saving may be possible.

p) Develop a District technology foundation that would accumulate and invest funding from multiple sources; the foundation would then allocate funds to the schools within the District in the most efficient manner. Increased efficiency in use of funds should reduce costs by $20 million.

q) Out source non-instructional services and reallocate sold assets and annual savings to instructional services. A saving of $25,000 per district per year, or $75 million may be possible.

r) Encourage the use of local residents as volunteers in all areas related to technology based systems. Assume a saving of 50 hours per year per school. At $40 per hour this equates to $23 million.

s) Match the technology to the task. If each school were to reduce its purchase of products by $400 per year, the savings over 5 years amounts to $5 million.

Tier II Suggestions:

a) Incent and reward school districts and libraries that reallocate existing funds to support the technology programs. Reallocation of $10,000 per school amounts to $11 million.

b) Suggest an upgrade in power, communications and environmental infrastructure design criteria for new construction to eliminate the need for future renovations. If 100 schools in the state prepare for future infrastructure additions, the savings could be $25,000 per school or $2.5 million

c) Suggest that all architectural firms that design schools and libraries within the State demonstrate knowledge of designing facilities for the use of technology. Savings could amount to $2.5 million by eliminating the need for future renovations to adapt to the needs of technology.

d) Create awareness of the need to plan new facilities (schools and libraries) to accommodate emerging information technologies. The savings are a component of those identified immediately above in paragraph c.

e) Offer a local tax break to community residents who donate usable (and appropriate) computers to their local school or library. The Plan assumes local donations.

f) Make every effort to take advantage of all forth coming Netdays by maximizing the use of volunteers. Wiring savings would be about $1,500 per school or $3.5 million.

g) Attempt to expand partnership relationships with NJ companies by soliciting their on going support of the state's schools and libraries.

h) Seek to combine district level installation, maintenance and support operations of the technology system under one contract. Savings could be $20 million.

i) Evaluate the potential savings associated with the use of computer simulations to reduce the cost of purchasing and safe guarding science equipment and associated support materials (e.g. chemicals). Assuming a saving of $2000 per school amounts to $4.5 million.

j) Look to local districts and libraries to coordinate the orderly retirement of obsolete equipment. The sale of aging equipment is assumed in this plan.

k) By coordinating the efforts of school and library technology coordinators attempt to develop and distribute procedures for the adoption of common software, e-mail and other applications, where deemed appropriate. Use of common platforms should save about $5 million.

(Total potential savings over 5 years = $514 million)

II. Revenue Initiatives for Consideration

Tier I Suggestions:

a) Seek voter approval of state bond issues dedicated to supporting technology programs throughout the state's schools and libraries.

b) Continue to leverage access to federal funding programs.

c) Make every effort to designate a technology funding component of the State lottery to be used for education and library technology enhancement

d) Encourage communities to obtain support for technology systems in schools and libraries from CATV companies or phone carriers as part of franchise or franchise renewal negotiations.

e) Suggest a sales tax on video rentals; the money to be used for distance learning programming

Tier II Suggestions:

f) Create awareness of the value of the NJ Education Network outside of New Jersey, and initiate a marketing program to develop this network as a revenue source

g) Offer NJ business the opportunity to partner with NJEN

h) Investigate the potential of offering access to technology room(s) after hours to civic organizations

i) Consider suggesting voluntary fees for the use of select technology products in public libraries.

Appendix E

Educational Technology Funding for K-12 Schools

Sources of Funding for Educational Technology, State by State[1]

Predominant Funding Sources in the States	Technology Implementation in Education (1=highest implementation, 3= lowest)	State General Funds	State Bonds	Designated Tax Sources	Telco Deregulation Funds	Private Sources	Lottery	Self Supported	No State Funding	Other sources
Alabama	3								X	
Alaska	3									Oil Royalties
Arizona	3								X	
Arkansas	1	$20 million from Arkansas Public School Computer Network			Southwestern Bell					
California	1	$20.8 million;			Pacific Bell $17 million					
Colorado	2				US West $5.5 million					
Connecticut	2		Knowledge Net		Southern New England Telephone Co.					
Delaware	1	$10 million/year			$250 million					
Florida	2	$7.2 million						X		
Georgia	1				$70 million		$20 million/ year			
Hawaii	3	X								
Idaho	1	$11 million Telecom								

---

[1] "x" indicates that technology funds are not delineated by line item in that State.

BEST COPY AVAILABLE

Predominant Funding Sources in the States	Technology Implementation in Education (1=highest implementation, 3= lowest)	State General Funds	State Bonds	Designated Tax sources	Telco deregulation funds	Private sources	Lottery	Self supported	No State funding	Other sources
Illinois	2	$6 million								
Indiana	1				Ameritech $30 million $24 million/year					
Iowa	1		$95 million/over 4 years							
Kansas	1				Southwestern Bell $64 million					
Kentucky	2	funding given for Educational Communications Network								
Louisiana	3									$2 Million: Goals 2000
Maine	1				NYNEX $20 million					
Maryland	1				Bell Atlantic $13.5 million					
Massachusetts	1		$60 million							
Michigan	2				Ameritech. $12 million					

BEST COPY AVAILABLE

Predominant Funding Sources in the States	**Technology Implementation in Education (1=highest implementation, 3= lowest)**	**State General Funds**	**State Bonds**	**Designated Tax sources**	**Telco deregulation funds**	**Private sources**	**Lottery**	**Self supported**	**No State funding**	**Other sources**
Minnesota	2	$15 million								
Mississippi	1	$30 million	$60 million							
Missouri	2	$7.1 million		Video Tax $5 million						
Montana	3									$2.5 million USWEST Foundation
Nebraska	3	X								
Nevada	2	$ 7.2 million			Nevada Bell $1.6 million					
New Hampshire	3									
New Jersey	3	$900, 000 $4.2 million Ed. Training Centers								
New Mexico	3									$2 million Extended Learning Fund
New York	3				$50 million NYNEX Diffusion Fund					
North Carolina	2	$2.5 million								
North Dakota	2	$1.5 million								
Ohio	1	$95 million			Ameritech $18 million					
Oklahoma	2		$14 million		Southwestern Bell $1 million					

BEST COPY AVAILABLE

Predominant Funding Sources in the States	**Technology Implementation in Education (1=highest implementation, 3= lowest)**	**State General Funds**	**State Bonds**	**Designated Tax sources**	**Telco deregulation funds**	**Private sources**	**Lottery**	**Self supported**	**No State funding**	**Other sources**
Oregon	3	X						X		
Pennsylvania	1	$120 million/over 3 years								
Rhode Island	1		$41 million							
South Carolina	3	X								
South Dakota	3								X	
Tennessee	2	$3 million			South Central Bell $2.5 million					
Texas	1				$95 million/ year					
Utah	2	$4.6 million								
Vermont	3					IBM $2 million				
Virginia	3				Bell Atlantic $1 million					
Washington	3									
West Virginia	3									

BEST COPY AVAILABLE

Predominant Funding Sources in the States	Technology Implementation in Education (1=highest implementation, 3= lowest)	State General Funds	State Bonds	Designated Tax sources	Telco deregulation funds	Private sources	Lottery	Self supported	No State funding	Other sources
Wisconsin	2	$10 million			Ameritech					
Wyoming	2	$1 million								

BEST COPY AVAILABLE

Introduction and Background

The State of New Jersey, like many other states, is undertaking a study of various funding alternatives for educational technology and telecommunications. The accelerating rate at which technologies are being adopted in support of the educational process is challenging states and local districts throughout the country to develop long term funding programs that can assure both the installation and support of the total technology system. Due to the differences that exist among states with regard to allowable funding programs, there is no standard method to pay for technology. There are however several funding models that are worth considering. The following discussion of funding options suggest ways that New Jersey may wish to consider as it develops a model most capable of meeting its needs.

The Basis for State Funding Levels

States use a variety of bases to set a level of funding required by, or offered to, K-12 educational technology development. Funding levels might be *vision-based*, that is, extrapolated through experts' assessments of minimal and ideal requirements for technology. A *needs-based* level could be established through an analysis of instructional and administrative needs for hardware, software, and training. Both bases tend to result in high levels of funding for technology. *Availability-based* funding, however, allocates a predetermined sum without concern for the absolute needs or envisioned needs of schools. Such a funding basis tends not to be directed toward the fulfillment of articulated technology goals, but rather toward the placement of a minimum standard of technology in schools.

Functional Responsibilities in Statewide Coordination

From an analysis of various states, certain commonalties are evident in the management and policy development of educational telecommunications. An overall policy of decentralization in implementation and coordination in planning is also evident across the states.

State Department of Education: Development of programs, staff, and connectivity in school districts appears to be the current focus of state departments of education. Education technology divisions within the departments are ensuring that students have access to educational technology for research and learning and that the schools are adequately supported by responsible staff members.

State Technology Coordination As a Predictor of Funding

States that have robust funding for educational telecommunications often have good governmental agency coordination systems also. Such cooperation is valuable for two reasons: First, where there is coordination of telecommunications, funding requests to the legislature are usually more coordinated, and legislators have more confidence that the funding will be used intelligently and equitably. Second, the infusion of substantial funds for educational telecommunications often requires some level of coordination for the administration of the funds or for the efficient use of the funds .

Purchasing and acquiring telecommunications equipment and transport is one element of coordinating telecommunications. Another potentially more important, activity, is designing and planning for the long-term telecommunications needs of education and state agencies in general. Recognizing the differences in the planning and the managing functions for telecommunications, some states have recently established agencies, councils, and boards to anticipate the future needs for, and directions of, the state information and telecommunications infrastructure. Maryland has its Information Technology Board, Virginia its Council on Information Management; Connecticut an Office of Information Technology. Those organizations, unlike divisions of telecommunications, are established to articulate policy and set directions for the state in implementation of information technology.

Some states organize centralized telecommunications planning on a formal, structured basis within an agency (e.g., North Carolina's Information Resources Management) or less formally through a committee or council. The trend across the USA is to establish less bureaucratic collaborative groups representing all agencies and stake-holders instead of new agencies of the state. Many of those agencies are mandated by the governor and funded by the legislature.

Size and Robustness of Funding of Educational Telecommunications

In terms of funding size alone, Texas, Georgia, and Iowa are identified as leaders in educational telecommunications investments. The Texas legislature, through a deal with the state's telephone service providers, obtained a pledge of $95 million per year for 10 years, to be deposited in the Telecommunications Infrastructure Fund. Most of the money will be used to finance K-12 school telecommunications development. The Texas fund dwarfs all other educational telecommunications funds.

Georgia began its capital development of educational telecommunications through the 1992 Distance Learning and Telemedicine Act and continues to build the project through state lottery revenues.

Iowa has already spent or committed approximately $200 million over a period of eight years to build its own Iowa Communications Network, reaching not only K-12 schools, but also colleges, hospitals, and government centers. K-12 schools, though, are among the largest users of ICN.

By contrast with Texas and Iowa, some states, like Alabama, do not set aside state funds of any kind for educational telecommunications. It is expected that schools will provide funding to support their own telecommunications projects.

Case studies of Georgia, Texas and Pennsylvania are provided below.

Georgia

Georgia has benefited from a generous system of funding for educational telecommunications, which provides both start-up capital and continuing or operating expenses. The start-up fund derived from a $50 million excess earnings charge, and the operating fund comes from lottery profits.

Most of the coordination of Georgia educational telecommunications occurs less formally. The Georgia Public Service Commission has approved the Classroom Communication Service Plan of Southern Bell to give Georgia schools service rates 40 to 80 percent lower than business rates. The Georgia Distance Learning and Telemedicine Act of 1992 (SB 144) continues to strongly influence distance learning in the state. SB 144 now has $70 million from an additional $20 million previously withheld by the Public Service Commission (PSC) to reimburse independent phone companies for revenues lost due to competition with the state. Since the amount requested by these companies was nominal, the bulk of the $20 million was reassigned to funding for projects in distance learning and telemedicine, as designated in SB 144. As of late 1995, $65 million had already been committed to a Universal Service Fund for these projects. The Distance Learning and Telecommunications Governing Board oversees the expenditures of this fund.

The distance learning network includes at least 206 sites, and the telemedicine network includes 57 sites. The Distance Learning and Telecommunications Board has agreed to fund an additional 125 sites and the Board of Regents will fund about 40 sites.

Georgia Public Television (GPTV) is a subset of GPTC. Through partial funding by the Distance Learning and Telemedicine Act, GPTV provides programming to every K-12 public school, college, university, community college, technical school, regional library, and regional service agency in the state through nearly 2200 satellite downlinks. The downlinks were funded jointly by the Distance Learning and Telemedicine Act of 1992 and the state lottery. To be completed in the fall of 1996, this system includes a full transponder on Telstar 401, and will provide six to eight channels with MPEG-2 compressed video.

The Georgia state lottery provides funding for educational projects and services in the state. In addition to satellite downlinks for every Georgia school, lottery money funds the full-tuition Hope scholarships for B-average high school and technical school seniors seeking higher education in Georgia. Lottery money also pays for computers, satellite dishes, other hardware and software, as well as maintenance and usage costs for these systems at all educational levels. The lottery funds a pre-K program for all children in the state. Through a $45.3 million appropriation for technology in schools and capital projects in 1994, the GPTV will build a state-of-the-art production facility for distance learning applications.

Approved by the governor in 1993, lottery earnings allocated for technology in the first year totaled approximately $250 million. While the state has not earned that much in subsequent years, they continue to receive large amounts of funding for scholarships, technology and other programs, and the program is slated to continue.

The Distance Learning and Telemedicine Board oversees the expenditures of the Universal Service Fund. Among other things, this one-time fund supports staff development and student instruction in technology. The Board has committed approximately $65 million of the $70 million Universal Service Fund. So far, $39 million of this has been spent on GSAMS, a cable project, a desktop video project, and an initiative to provide Internet access through public libraries.

SB 137, passed in 1995, requires Tier One telecommunication service providers who have spent an average of $500 million per year on infrastructure to continue to spend that amount per year over the next five years to improve infrastructure in Georgia. While this is not a legal obligation, it has encouraged the development of distance learning and telemedicine infrastructure within the $500 million framework.

Texas

Until very recently, Texas did not have a statewide plan for educational telecommunications since the retirement in the late 1980s of an energetic board of regents staff member. The planning process fell inactive, and only at the K-12 level was there engagement in planning. Even then, the K-12 representatives within the Texas Education Agency (TEA) focused on technology to redress inequities in school funding, not on telecommunications *per se*.

Since Governor Bush's administration developed a telecommunications deregulation plan, coordination has become a priority, particularly concerning the disbursement of the largest educational telecommunications fund ever created by a state. K-12 schools will receive the lion's share of a $95 million per year fund. Higher education and telemedicine will reap a smaller portion.

For implementation of educational telecommunications, the state relies on a central buying agency, the Department of Information Resources. Telecommunications projects are presented to the Department for acquisition. The Department generates cooperative purchases, negotiates rates, sets standards, and formulates purchasing plans for information technology on behalf of state agencies.

The Telecommunication Services Division in DIR manages a statewide network used by state agencies, higher education institutions, and educational service centers for school districts. The Division also provides bandwidth for data transfer and video via standard multiplexed T-1, and DS-3 technology for distance learning, telemedicine, and library traffic. DIR is working to implement SONET technology in 1996 to meet future bandwidth needs on existing networks. The Division, which employs ISDN technology, plans to begin migrating to an ATM environment during 1996.

While DIR functions in a planning role, particularly in facilitating planning for computing hardware and software, Telecommunications Services provides acquisition services for the purchase of bandwidth to agencies that need it.

Clustering of schools for telecommunications connections is funded by allocations other than the new Senate Bill 2128 Telecommunications Infrastructure Fund. It is expected that an initiative to integrate all networks within the state may soon evolve to ensure that institutions are able to share programmatic resources through a coordinated service.

State Educational Telecommunications Networks

The TEA-initiated Texas School Telecommunications Access Resource (T-STAR) provides one-way video, two-way audio and full data services using both TVRO (television receive only) and VSAT (Very Small Aperture Terminal) technologies. T-STAR has installed or has grants for the installation of a satellite dish in over 900 of the 1,000 school districts in the state. This initiative will now be funded through the telecommunications infrastructure fund.

Texas Telecommunications Infrastructure Fund Summary

The Telecommunications Infrastructure Fund (TIF) is funded by two main entities:
1) the Telecommunications Utility account--financed by an annual assessment of all telecommunications utilities doing business in the state of Texas.
2) the Commercial Mobile Service Providers account--financed by an annual assessment of all commercial mobile service providers doing business in the state of Texas.

It was decided that the commercial mobile service providers benefit from the public telecommunication network by their ability to receive and generate calls transgressing the mobile/cellular network; and that they benefit because of the advancement of the public telecommunications network through projects funded under this section. Therefore, commercial mobile service providers must contribute to the TIF. The TIF is also supplemented by monetary gifts and grants.

The TIF is administered by a nine-member committee, appointed by the governor and the lt. governor. These appointees represent all cross-sections of education (K-12, higher ed., etc.), and libraries.

Beginning in fiscal year 1995 (starting September 1), the comptroller collects a total amount of $75 million each from telecommunications utilities and the commercial mobile service providers. This will continue for the nine fiscal years immediately following.

Moneys from the telecommunications utilities account will be used to award grants and loans to fund equipment purchases (include. computers, printers, computer labs, and video equipment) for public schools and for intracampus and intercampus wiring to enable those public schools to use the equipment. The moneys from the commercial mobile service providers account will be used to award grants and loans for equipment purchases, wiring, material, program development, training, installation costs, or any statewide telecommunications network.

Grants may be awarded for projects and proposals that:
(1) provide equipment and infrastructure needed for distance learning, information sharing programs of libraries and telemedicine services.
(2) develop and implement the initial or prototypical delivery of courses and other distance learning material
(3) train teachers, faculty, librarians, or technicians in the use of distance learning or information sharing materials and equipment.
(4) develop curricula and instructional material especially suited for delivery by telecommunications
(5) provide electronic information
(6) establish or carry out information sharing programs

Priority will be given to those projects and proposals that:
(1) Represent collaborative efforts involving multiple schools, universities, or libraries
(2) contribute matching funds from other sources
(3) show promise of becoming self-sustaining
(4) help users of information learn new ways to acquire and use information through telecommunications
(5) extend specific educational information and knowledge services to groups not previously served, especially those in rural and remote areas
(6) result in more efficient or effective learning than through conventional teaching
(7) improve the effectiveness and efficiency of health care delivery
(8) take advantage of distance learning opportunities in rural and urban school districts with disproportionate numbers of at-risk youths or with high dropout rates.

Pennsylvania

Project Link to Learn

A 1995 Quality Education Data, Inc. study reported that Pennsylvania ranked 47th out of the 50 states in regard to computer technology in schools.

In an effort to improve this extremely poor showing, the Pennsylvania Department of Education has instituted a program revision amounting to $121 million over a three-year period for school districts and public higher education institutions including community colleges to develop and invest in advanced computer and telecommunications technology for the purpose of creating the Pennsylvania Education Network (PEN). The goal of this initiative is to transform the traditional classroom (limited by institutional and geographic boundaries) in Pennsylvania into one where students are provided with virtually unlimited access to information and expertise in nearly limited subject areas.

Component One

The first component of this program targets $100 million over 3 years to improve the basic technology infrastructure and capabilities of public K-12 schools. In the first year of this program, $33.3 million will be available for eligible school districts to invest in the acquisition of new or replacement computers, the implementation of local area networks and wide area networks to position schools for eventual connection to the PEN, and to train teachers to integrate technology into course curricula. The Distance Learning grant program will also make $1.5 available to poor and rural school districts to purchase distance learning technologies.

Component Two

The second component gives $21 million over 3 years to the State System of Higher Education (SSHE); the State-related Universities: Penn State, the University of Pittsburgh, Temple University, and Lincoln University; and the community colleges.

PEN will provide the Statewide infrastructure to link all public K-12 schools, intermediate units, community colleges, public universities and public libraries throughout the Commonwealth in to a comprehensive, high-capacity network to support the exchange of voice, video and data communications.

The first year of funding will concentrate on 3 areas:

(1) assessing current telecommunications infrastructure resources in Pennsylvania, including types (telephone, cable, microwave, satellite, etc.), areas of coverage, strengths and weaknesses, and opportunities for expansion.

(2) establishing technology test sites for the purpose of evaluating if and how competing telecommunications technologies can be integrated in to a complementary network.

(3) the development of a strategic action plan for building the PEN.

Second and third year funding will be devoted to building the infrastructure and connecting all participating sites.

While the program concentrates on public institutions, private institutions and businesses have been encouraged to participate in the "link-up."

SEC.254. UNIVERSAL SERVICE.

(a) PROCEDURES TO REVIEW UNIVERSAL SERVICE REQUIREMENTS.

(1) FEDERAL-STATE JOINT BOARD ON UNIVERSAL SERVICE- Within one month after the date of enactment of the Telecommunications Act of 1996, the Commission shall institute and refer to a Federal-State Joint Board under section 410(c) a proceeding to recommend changes to any of its regulations in order to implement sections 214(e) and this section, including the definition of the services that are supported by Federal universal service support mechanisms and a specific timetable for completion of such recommendations. In addition to the members of the Joint Board required under section 410(c), one member of such Joint Board shall be a State-appointed utility consumer advocate nominated by a national organization of State utility consumer advocates. The Joint Board shall, after notice and opportunity for public comment, make its recommendations to the Commission 9 months after the date of enactment of the Telecommunications Act of 1996.

(2) COMMISSION ACTION.- The Commission shall initiate a single proceeding to implement the recommendations from the Joint Board required by paragraph (1) and shall complete such proceeding within 15 months after the date of enactment of the Telecommunications Act of 1996. The rules established by such proceeding shall include a definition of the services that ate supported by federal Universal service support mechanisms and a specific timetable for implementation. Thereafter, the Commission shall compete any proceeding to implement subsequent recommendations from any joint Board on universal service within one year after receiving such recommendations.

(b) UNIVERSAL SERVICE PRINCIPLES.-The Joint board and the Commission shall base policies for the preservation and advancement of universal service on the following principles:

(1) QUALITY AND RATES.- Quality services should be available at just, reasonable, and affordable rates.

(2) ACCESS TO ADVANCED SERVICES.- Access to advanced telecommunications and information services should be provided in all regions of the Nation.

(3) ACCESS IN RURAL AND HIGH COST AREAS.- Consumers in all regions of the nation, including low-income consumers and those in rural, insular, and highcost areas, should have access totelecommunicationss and information services, including interexchange services and advanced telecommunications and information services, that are reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas.

(4) EQUITABLE AND NONDISCRIMINATORY CONTRIBUTIONS.- All providers of telecommunications services should make an equitable and nondiscriminatory contributions to the preservation and advancement of universal service.

(5) SPECIFIC AND PREDICTABLE SUPPORT MECHANISMS.- There should be specific, predictable and sufficient Federal and State mechanisms to preserve and advance universal service.

(6) ACCESS TO ADVANCEDTELECOMMUNICATIONSS SERVICES FOR SCHOOLS, HEALTH CARE, AND LIBRARIES.-Elementary and secondary schools and classrooms, health careproviderss, and libraries should have access to advanced telecommunications services as described in subsection (h).

(7) ADDITIONAL PRINCIPLES.- Such other principles as the joint Board and the Commission determine are necessary and appropriate for the protection of the public interest, convenience, and necessity and are consistent with this Act.

(c) DEFINITION.-

(1) IN GENERAL.- Universal service is an evolving level of telecommunications services that the Commission shall establish periodically under this section, taking into account advances in telecommunications and information technologies and services. The Joint board in recommending, and the Commission in establishing, the definition of the services that tar supported by federal universal service support mechanisms shall consider the extent to which such telecommunications services.-

(A) are essential to education, public health, or public safety;

(B) have, through the operation of market choices by customers been subscribed to by a substantial majority of residential customers;

(C) are being deployed in public telecommunications networks by telecommunications carriers; and

(D) are consistent with the public interest, convenience, and necessity.

(2) ALTERATIONS AND MODIFICATIONS.- The Joint Board may, from time to time, recommend to the Commission modifications in the definition of the services that are supported by federal universal service support mechanisms.

(3) SPECIAL SERVICES.- In additional to the services included in the definition of universal service under paragraph (1), the Commission may designate additional services for such support mechanisms for schools, libraries, and health care providers for the purposes of subsection (h).

(d) TELECOMMUNICATIONS CARRIER CONTRIBUTION.- Every telecommunications carrier that provides interstate telecommunications services shall contribute, on an equitable and nondiscriminatory basis, to the specific, predictable, and sufficient mechanisms established by the Commission to preserve and advance universal service. The Commission may exempt a carrier or class of carriers from this requirement if the carrier's telecommunications activities are limited to such an extent that the level of such carrier's contribution to the preservation and advancement of universal service would be de minimis. Any other provider of interstate telecommunications may be required to contribute to the preservation and advancement of universal service if the public interest so requires.

(e) UNIVERSAL SERVICE SUPPORT.- After the date on which Commission regulations implementing this section take effect, only on eligible telecommunications carrier designated under section 214(e) shall be eligible to receive specific Federal universal service support. A carrier that receives such support shall use that support only for the provision, maintenance, and upgrading of facilities and services for which the support is intended. Any such support should be explicit and sufficient to achieve the purposes of this action.

(f) STATE AUTHORITY.- A State may adopt regulations not inconsistent with the

Commission's rules to preserve and advance universal service. Every telecommunications carrier that provides intrastate telecommunications services shall contribute, on an equitable and nondiscriminatory basis, in manner determined by the State to the preservation and advancement of universal service in that State. A State may adopt regulations to provide for additional definitions and standards to reserve and advance universal service within that State only to the extent that such regulations adopt additional specific, predictable, and sufficient mechanisms to support such definitions or standards that do not rely on or burden Federal universal service support mechanisms.

(g) INTEREXCHANGE AND INTERSTATE SERVICES.- Within 6 months after that date of enactment of the Telecommunications Act of 1996, the Commission shall adopt rules to require that the rates charged by providers of interexchange telecommunications services to subscribers in rural and high cost areas shall be no higher than the rates charged by each such provider of interstate interexchange telecommunications services shall provide such services to its subscribers in each State at rates no higher than the rates charged to its subscribers in any other State.

(h) TELECOMMUNICATIONS SERVICES FOR CERTAIN PROVIDERS.-

(1) IN GENERAL.-

(A) HEALTH CARE PROVIDERS FOR RURAL AREAS.-A telecommunications carrier shall, upon receiving a bona file request, provide telecommunicaiotns services which are necessary for the provision of health care services in a State, including instruvtion relating to such services, to any public or nonprofit health care provier that serves persons who reside in rural areas in that State at rates that are reasonably comparable to rates charged for similar services in urban areas in that State. A telecommunications carrier providding service under this paragraph shall be entitled to have an amount equal to the difference, if any, between the rates for services provided to health care providers for rural areas in a State and the rates for similar services provided to other customers in comparable rural areas in that State treated as a service obligation as a part of its obligation to participate in the mechanisms to preserve and advance universal service.

(B) EDUCATIONAL PROVIDERS AND LIBRARIES.- All telecommunicaitons carriers serving a geographic area shall, upon a bona fide request for any of its services that are within the definition of universal service under subsection (c)(3), provide such services to elementary schools, secondary schools, and libraries for educational purposes at rates less than the amounts charged for similar services to other parties. The discount shall be an amount that the Commission, with respect to interstate services, and the States, with respect to interstate services, determine is appropriate and necessary to ensure affordable access to and use of such services by such entities. A telecommunications carrier providing service under this paragraph shall.-

(i) have an amount equal to the amount of the discount treated as an offset to its obligation to contribute to the mechanisms to preserve and advance universal service, or

(ii) notwithstanding the provisions of subsetion (e) of this section, receive reimbursement utilizing the support mechanisms to preserve and advance universal service.

(2) ADVANCED SERVICES.- The Commission shall establish competitively neutral rules-

(A) to enhance, to the extent technically feasible and economically reasonable, access to advanced telecommunications and informatoin services for all public and nonprofit elementary and secondary school classrooms, health care providers, and libraries; and

(B) to define the circumstances under which a telecommuications carrier may be required to connect its network to such public institutional telecommunications users.

(3) TERMS AND CONDITIONS.-Telecommunicatons services and network capacity provided to a public institutional telecommunications user under this subsection may not be sold, resold, or otherwise transferred by such user in consideration for money or any other thing of value.

(4) ELIGIBILITY OF USERS.- No entity listed in this usbsection shall be entitled to preferential rates or treatmet as required by this subsection, if such entity operates as a for-profit business, is a school described in paragrpah (5)(A) with an endowment of more than $50,000,000, or is a library not eligible for participation in State-based plans for funds under title III of the Library Services and Construction Act (20 U.S.C. 335c et seq.).

(5) DEFINITIONS.- For purposes of this subsection:

(A) ELEMENTARY AND SECONDARY SCHOOLS.- The Term 'elementary and secondary schools' means elementary schools and secondary schools, as defined in paragraphs (14) and (25), respectively, of section 14101 of the Elementary and Secondary Education Actof 1965 (20 U.S.C. 8801).

(B) HEALTH CARE PROVIDER.-The term 'health care provider' means-

(i) post-secondary educational institutions offering health care instruction, teaching hospitals, and medical schools;

(ii) community health centers or health centers providing health care to migrants;

(iii) local health departments or agencies;

(iv) community mental health centers;

(v) not-for-profit hospitals;

(vi) rural health clinics; and

(vii) consortia of health care providers consisting of one or more entities described in clauses (i) through (vi).

(C) PUBLIC INSTITUTIONAL TELECOMMUNICATIONS USER.- The term 'public institutional telecommunications user' means an elementary or secondary school, a library, or a health care provider as those terms are defined in this paragraph.

(i) CONSUMER PROTECTION.- The Commission and the States should ensure that universal service is available at rates that are just, reasonable, and affordable.

(j) LIFELINE ASSISTANCE.- Nothing in this section shall affect the collection, distribution, or administration of the Lifeline Assistance Program provided for by the Commission under regulations set forth in section69.117 of title 47, Code of Federal Regulations, and other related sections of such title.

(k) SUBSIDY OF COMPETITIVE SERVICES PROHIBITED.-A telecommunicaitons carrier may not use services that are not competitive to subsidize services that are not competitive to subsidize services that are subject to competition. The commission, with respect to interstate services, and the States, with respect to intrastate services, shall establish any necessary cost allocation rules, accounting safeguards, and guidelines to ensure that services included in the definition of universal service bear no more than a reasonable share of the joint and common costs of facilities used to provide those services.

STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES
DOCKET NO. TX95120631

:
IN THE MATTER OF THE :
INVESTIGATION REGARDING :
LOCAL EXCHANGE COMPETITION :
FOR TELECOMMUNICATIONS SERVICES :
:

BRIEF AND APPENDIX ON BEHALF OF THE DIVISION OF THE RATEPAYER ADVOCATE ON UNIVERSAL SERVICE ISSUES

BLOSSOM A. PERETZ, ESQ.
RATEPAYER ADVOCATE
OF NEW JERSEY
Division of the Ratepayer Advocate
31 Clinton Street - 11th Floor
P.O. Box 46005
Newark, New Jersey 07101
(973) 648-2690

BLOSSOM A. PERETZ
Ratepayer Advocate
Of Counsel

HEIKKI LEESMENT
Deputy Ratepayer Advocate

LAWANDA R. GILBERT
Assistant Deputy Ratepayer Advocate
On the Biref

Filed at the BPU on
December 9, 1996

Currently New Jersey ranks 38th in the nation in the number of computers available to students.[8] Clearly measures must be taken to raise our rankings and ensure that New Jersey's students are not disadvantaged with the ever increasing importance of technology in today's society. To address these concerns, the Ratepayer Advocate is currently developing a comprehensive report for the New Jersey Legislature concerning the technology needs for schools and libraries. This report will include proposals with the goal of ensuring that New Jersey's schools and libraries meet the educational needs of our state in the information age. Recognizing that the needs are great, it is incumbent upon the Board and the telecommunications industry to reduce the telecommunications costs of our schools and libraries to the maximum degree possible, thus increasing the funding available for the considerable costs associated with equipment and training that must be resolved. The goals of this program include: *(1)* establishing a sufficient technological capability within schools so that students and school districts obtain the benefits of distance learning and are not just exposed to, but are actually able to make extensive use of such technologies; *(2)* to provide an appropriate number of computers in the classrooms so that computers are fully integrated into all aspects of the curriculum and computer access is more than just a dream to the majority of New Jersey's students; *(3)* establish local libraries as technology centers that can be used by all citizens to access the Internet and other information.

A quantification of the overall cost of the schools and library program will be identified in the report that the Advocate is currently preparing for the New Jersey Legislature. When the report is finalized, its conclusion and analysis will be submitted to the Board, hopefully with the Advocate's reply comments in this phase of the local competition docket. While the program will require significant expenditures, the consequences of not undertaking the program will be incalculable in monetary terms, through reduced capabilities of our students and diminished career opportunities for decades to come. In the current proceeding, the Board has an opportunity to partner with the Legislature and our schools and libraries in creating integrated solutions and comprehensive public policies in several public areas. By sharing the common burden and absorbing a measure of these costs through the New Jersey Universal Service Fund, thereby reducing the costs which taxpayers, schools and libraries would otherwise have to bear, the Board can be a catalyst for fundamental improvement to education throughout the State. For many of the state's citizens, schools and libraries will be the only access they have to the Internet.

---

[8] Source: *USA Today*, p. 6D, Wednesday, June 5, 1996.

The Ratepayer Advocate recommends that the Board adopt a telecommunications discount program for schools and libraries that is consistent with that recommended by the Federal-State Joint Board while avoiding certain fundamental limitations that represent potentially serious defects in that program as it may apply to New Jersey. Specifically, Paragraph 555 of the Joint Board decision provides for *potential* discounts for schools as follows:

DISCOUNT MATRIX	COST OF SERVICE (estimated percent in category)			
HOW DISADVANTAGED? based on percent of students in the national school lunch program (estimated percent in category)		low cost (67%)	mid-cost (26%)	highest cost (7%)
	< 1 (3%)	20	20	25
	1-19 (30.7%)	40	45	50
	20-34 (19%)	50	55	60
	35-49 (15%)	60	65	70
	50-74 (16%)	80	80	80
	75-100 (16.3%)	90	90	90

While the above program represents significant potential needs-based discounts, it is not clear (1) the extent to which NJ's schools will qualify for a very significant discount, or (2) whether the FCC will adopt the Joint Board decision, or (3) the extent to which the national cap of $2.25 billion will additionally impact on New Jersey. New Jersey needs to decide what is required, and make it happen.

The Board must take actions that ensure, not by chance or depending on other circumstances, that all schools and libraries in this State have the ability to afford the advanced communications capabilities necessary to improve the education of our young citizens, and not leave this vitally important societal goal subject to the vagaries and uncertainties of the federal program. This must be a priority for the Board and for the State. Consistent with that goal, the Ratepayer Advocate proposes that, as an initial measure, the Board adopt the discounts proposed by the Joint Board, *without the cap*, as the level of discount to be afforded to New Jersey's schools and libraries. In addition, the Board should require that schools and libraries receive local exchange service and all other services tariffed separately for residential subscribers at rates that are no higher than those at which equivalent services are provided to residential customers on a statewide basis. This latter recommendation recognizes not only the fiscal pressures of schools and libraries, but also that, for many users, the only practical vehicle for accessing the Internet will be through schools and libraries. In other words, for many citizens, school and library telecommunications represents telecommunications that, for others, is residential service.

Finally, the Ratepayer Advocate recommends that, if a school, due to unique local conditions finds that the level of funding for which it is eligible under the federal and State programs is insufficient, then it should have an opportunity to seek additional support from the telecommunications fund. The Board should cooperate with the State Department of Education in determining any reallocation of the fund in response to such requests.

It is clear that there are many unknowns with regard to the schools and library program recommended by the Joint Board. While the ultimate level of funding for any given state is unknown, it is also not known whether the benefits of that program will enable schools and libraries to actually afford distance learning and Internet access for most students. It must be recognized that the total cost of Internet service includes not only telecommunications access, but also a substantial hardware cost. In view of the unknowns, the Board should review the results of the school and library fund after two years, to ensure that the fund is working to achieve the State's goals.

VIII. FEDERAL SUBSIDY PROGRAMS

Universal telecommunications service has been supported by a number of federal and state programs. Two low-income programs currently exist under federal auspices – Lifeline and Link-Up America. The Lifeline program consists of two plans, but only California participates in Plan 1, which is not discussed herein. Plan 2, in which over 30 states have elected to participate *but not including New Jersey*, provides that a subscriber's bill could be reduced by twice the $3.50 monthly Subscriber Line Charge, or more, if the state more than matches the value of the federal waiver. The state contribution can come from any source including connection charges, customer deposit requirements and state assistance for basic local telephone service.

The Link-Up America program provides assistance by reducing the service connection charges paid by eligible customers, up to one-half of the carrier's customary connection charge or $30.00, whichever is less.

Other programs, such as the Carrier Common Line Charge ("CCLC"), were intended to provide overall cost support for local exchange services without being targeted either to high cost areas or low income customers. Finally, New Jersey historically has adopted the practice of charging relatively low rates for basic local exchange service, with the hope that this would encourage subscribership. Due to the extremely small local calling areas in New Jersey, low

Appendix H

Sources of Federal Technology Funds

U.S. Department of Education

- **National Challenge Grants for Technology in Education**

Awards grants to consortia including at least one local education agency with a high percentage of children living below the poverty line and may include other local education agencies. Promotes the integration of the acquired technologies into the curriculum.
Approximately $27 million was appropriated in FY '95. (202) 708-6001

- **Star Schools Program**

Supports telecommunications partnerships to provide telecommunications equipment and programming to undeserved students. More than 50,000 teachers have participated in staff development and community awareness activities produced via satellite, compressed video technology, fiber optics, video disc, and micro -computer based networks.
Approximately $25 million was available in FY '95. (202) 219-2186

- **Public Library Construction and Technology Enhancement (State Program)**

Provides grants to States for facilities and technology enhancements to improve the provision of public library services. States may approve local projects for construction, remodeling, or alteration of existing buildings. States have combined funds provided for the Public Library Services Program and the Interlibrary Cooperation and Resource Sharing Program to support the purchase of equipment and network connections.
(202) 219-1303

- **Technology , Educational Media, and Materials for Individuals with Disabilities**

Funds projects and centers for advancing the use of new technology, media, and materials in the education of children and youth who are disabled.
(202) 205-8193

- **Small Business Innovation Research Program**

Seeks to help meet federal R&D needs and to stimulate technological innovation in small business, while requiring private sector commercialization of developed products. The program has focused on the development of products which use computers and other high tech equipment for teaching.
During the FY 1993 the U.S. Department Of Education awarded $3.5 million in FY '95, received 163 proposals and awarded 45 of them. (202) 219-2065

BEST COPY AVAILABLE

Additional Funding Sources for Software and Hardware

- **Title I, ESEA**

Funds almost one-third of all software and hardware used primarily for basic skills instruction.

- **Chapter 2, ESEA**

In FY '94 approximately $125 million of Chapter 2 funds were spent on software and hardware purchases. A total of $347 million has been appropriated for FY '95.

- **School-to-Work**

Grants for the implementation of School-to-Work programs integrating academic and vocational learning with work-based learning.
In FY '95 $125 million was appropriated by both Departments of Education and Labor.

- **Goals 2000**

Provides a planning grant to each state to integrate technology into overall state education plans. $403 million was appropriated in "FY 95.

- **Eisenhower Professional Development**

The majority of these funds are intended to support sustained professional development programs for teachers in the core subject areas. LEAs may use Eisenhower funds to purchase computers and other telecommunication equipment as outlined in the LEA's overall professional development plan.

- **Event Start**

Provided pre-K - 1 schools with $102 million in FY '95.

National Science Foundation

- **Applications of Advanced Technologies Program**

Provides grants to examine the strengths and weakness of new, innovative applications of advanced technologies for teaching and learning of science and mathematics.
Deadline for applications is January 15 and September 15 of every year.

- **The Networking Infrastructure for Education Program (NIEP)**

Grants to academic institutions, school districts, professional societies, state agencies, and others concerned with education reform to complete policy studies and research, development and demonstration projects related to the role of electronic networks in support of education reform. FY '96 focus is on evaluation of the impact of technology , dissemination of outcomes, and electronic library prototypes. (703) 306-1651, (202) 306-1130

- **Teacher Enhancement Program**

Seeks to improve interdisciplinary and pedagogical knowledge of teachers, administrators, and others who play roles in providing mathematics, science, and technology education for pre-k to grade 12 students.
(703) 306-1620

The Department of Energy, (DOE)

The DOE's 10 national laboratories and 30 specialized technology centers and research facilities provide educational experiences for students, training, and curriculum materials for pre-service and in service teachers. DOE also supports statewide initiatives to reform math, science, and technology education in 13 states.

DOE's technology offerings range from equipment loan and donation programs to long term studies on the effectiveness of specific educational technologies for classroom instruction.

- **Small Business Innovation Research Program**

Seeks to increase private sector commercialization of technology developed through DOE supported R&D in any scientific or engineering activity that is directed toward applying new knowledge to meet a recognized need; and/or a systemic application of knowledge toward the production of materials, devices, and systems or methods.
Awards approximately 200 grants to small businesses. (301) 903-5867

The Department of Commerce

- **The Telecommunications and Information Infrastructure Application Program (TIIAP)**

Awards matching grants to state and local governments and nonprofits for the planning and construction of telecommunications networks for the provision of educational, cultural, health care, public information, public safety and other social services.
Approximately $60 million was available for the program in FY '95. (202) 482-5802

- **The Public Telecommunications Facilities Program (PTFP)**

Awards matching grants to non-commercial entities to purchase telecommunications equipment with the stipulation that the equipment be used for educational or cultural purposes.
In FY '95 approximately $29 million was available. (202) 482-5802

National Aeronautics and Space Administration (NASA)

Small Business Innovation Program (SBIR) seeks to develop innovative technologies by

providing competitive research contracts to US owned small business to develop leading-edge technologies.
In FY '95 $124 million was available. (301) 918-8150

U.S. Department of Defense-Advanced Research Projects Agency

- **Defense Technology Conversion, Reinvestment and Transition Assistance -The Technology Reinvestment Program (TRP)**

TRP is a six agency technology investment effort that includes the Department of Defense, Commerce, Energy, and Transportation, the National Science Foundation, and NASA. The program requires partnerships and focuses on cost sharing between the partnerships, assisting small businesses and defense -dependent businesses; TRP seeks to develop dual use technologies.
1-800-DUAL-USE

U.S. Department of Agriculture (USDA)

- **The Agricultural Telecommunications Program**

Provides funding for the use of telecommunications in rural and urban areas.
(202) 720-6084

- **The Rural Utilities Service Telecommunications Loan Program**

RUS financing is used by rural telecommunications providers to build new and modernize existing telecommunications networks, connect new subscribers in unserved areas, and provide the transmission and switching facilities necessary for economic development, distance learning, and telemedicine applications, and Internet access.
(202) 720-1007

- **Rural Utilities service Distance Learning Grant Program**

RUS' Distance Learning grant program provides grants directly to rural schools, libraries, and other educational institutions for the development of telecommunications systems.
(202) 720-1007

The National Endowment for the Humanities

For all NEH programs listed here, for more information contact the Division of Research and Education at (202) 606-8380, education@neh.fed.us, research@neh.fed.us, http://www.neh.fed.us

- **Development and Demonstration**

Development and Demonstration funds projects related to software development and field

testing.
There is approximately $1 million available through this program.

- **Humanities Focus Grants**

These grants are small awards, up to $25,000, which go to specific projects in the humanities, including the use of technology. Deadlines for application are January 15th and September 15th of each year.

- **Teaching with Technology**

This program funds three types of projects: materials development, field testing and classroom applications, and teacher preparation for integrating technology into the classroom.

- **National Summer Institutes and Seminars**

Seminars are small groups of teachers who want to receive teacher training from a scholar in their field of interest. Institutes are groups of 25 teachers who study work with a faculty of scholars to explore in depth materials related to the subjects they teach.
Deadlines are March 1st, 1997 and March 1st, 1998 for the following summers. (202) 606-8463

- **Challenge Grants**

The challenge grant program helps academic institutions and cultural organizations to secure long term support for, and improvements in their programs, activities and resources related to the humanities, including the use and applications of technology.
The federal portions of the grants have ranged from $25,000 to $1 million. Application deadline is May 1, 1996. (202) 606-8309

Other Funding Guide Sources

- **The USDLA Funding Source Book for Distance Learning and Educational Technology**

The USDLA Funding Source Book is a reference publication complete with electronic and print references of funding sources for technology. It is available for $42.50 plus $4.00 shipping. To order contact Kendall Publishing at 1-800-228-0810.

- **Directory of Building and Equipment Grants**

This directory lists funding sources for equipment, building and renovation and innovative procedures to secure funding for computers and free computer software. The cost is $57.50 +$6.00 shipping and handling. (407) 795-6129.

- **Federal Register**

This daily publication contains notices of new grants from federal agencies, grant application guidelines, and regulations and requirements for federal grant programs. To order contact:

Superintendent of Documents, U.S. Government Printing Office, PO Box 371954, Pittsburgh, PA 15250-7954. (202) 512-1800.

Final Note:

This guide is by no means complete it provides only some of the resources available throughout the Federal government for educational technology.

Sources of Further Information

Getting Started: Sources of General Information

KickStart Initiative: Connecting America's Communities to the Information Superhighway.

Final report of the National Information Infrastructure Advisory Council. This general report makes the case for what entire communities, not just schools, will gain from connecting to the information superhighway. It is packed with valuable information and examples from across the country. The report is available from the Benton Foundation, (202) 638-5770, and is available online at http://www.benton.org/KickStart/.

The Department of Education's Regional Technology in Education Consortia (R*TECs) provide advice and services free to states and school districts. There are six consortia, each serving a region of the country:

> AK, WA, OR, ID, MT, WY: Northwest Regional Technology Consortium at (503) 275-9624. Contact: Seymour Hanflin, Director.
>
> ND, SD, MN, IA, WI, IL, MI, IN: North Central Regional Technology Consortium, (708) 218-1272 or (708) 571-4700. Contact: Rafael Ramirez, Director.
>
> OH, PA, MD, DC, NJ, DE, CT, RI, NY, VT, MA, NH, ME: Northeast Regional Technology Consortium, (212) 541-0972. Contact: Bonnie Brownstein, Co-Director.
>
> CA, HI, NV, UT, AZ, CO, NM, Territories: Pacific/Southwest Regional Technology Consortium, (310) 985-1570. Contact: Kevin Rocap, Co-Director.
>
> NE, KS, OK, TX, MO: South Central Regional Technology Consortium, (913) 864-4954. Contact: Jerry Chaffin or Ron Aust, Co-Directors.
>
> AR, LA, MS, AL, GA, FL, SC, NC, VA, WV, KY, TN, PR, Virgin Islands: Southeast and Islands Regional Technology Consortium, (910) 334-3211. Contact: Jean Williams, Co-Director.

Plugging In: Choosing and Using Educational Technology. Available from the Council for Educational Development and Research, (202) 223-1593.

Connecting to the Future. A Guide for Building a Network Infrastructure for Education. A video and handbook developed by NASA and the National Center for Education Statistics, available from NASA CORE (216) 774-1051.

From Here to Technology: How to Fund Hardware, Software, and More. Available from the American Association of School Administrators. (703) 875-0748.

The International Society for Technology in Education (ISTE). ISTE represents computer-using teachers. Its catalog, "Resources and Services for Technology-Using Educators," is available free and lists products and services related to technology in schools. (800) 336-5191.

The National School Boards Association (NSBA) sells a variety of publications to help school and district administrators use technology effectively. A catalog is available by calling (800) 706-6722.

Government Resources On-Line

U.S. Department of Education - http://www.ed.gov
http://www.ed.gov/Technology

The White House - http://www.whitehouse.gov
http://www.whitehouse.gov/edtech.html

The Library of Congress - http://lcweb.loc.gov

Thomas (Information about the U.S. Congress) - http://thomas.loc.gov/

The Supreme Court - http://www.law.cornell.edu/supct/

FedWorld (Entry to government resources) - http://www.fedworld.gov

U.S. Census Bureau Home Page - http://www.census.gov

National Telecommunications and Information Administration - http://www.ntia.doc.gov

Department of Defense Education Gateway - http://www.acq.osd.mil/ddre/edugate

Department of Energy laboratories - http://www.doe.gov/html/servers/lablogos.html

Department of Labor - Employment and Training Administration (ETA)
http://www.doleta.gov/programs/programs.htm

School to Work Opportunities - http://www.doleta.gov/programs/stw/stw.htm

The Kennedy Center for the Performing Arts - ArtsEdge -
http://artsedge.kennedy-center.org/

National Aeronautics and Space Administration Educational Resources -
http://quest.arc.nasa.gov/OER/

NASA's K-12 Internet Initiative - http://quest.arc.nasa.gov/

National Oceanic and Atmospheric Administration (NOAA) -
gopher://gopher.esdim.noaa.gov/11/NOAA_systems/education/

National Science Foundation - http://www.nsf.gov

United States Geological Survey Education Resources - http://www.usgs.gov/education

United States Information Agency Education and Cultural Exchanges -
http://www.usia.gov/education/leburus.htm

Department of Education Funded Projects On-Line

National Regional Laboratories Home Page -
http://www.nwrel.org/national/regional-labs.html

Regional Technology Education Consortia - http://rtec.org

Eisenhower National Clearinghouse for Mathematics and Science Education -
http://www.enc.org

National Clearinghouse for Bilingual Education - http://www.ncbe.gwu.edu

Office of Special Education and Rehabilitative Services Regional Resources and Federal Centers - http://aed.org/special.ed/rrfc1.html

Rehabilitation Engineering Research Center on Universal Telecommunications Access -
http://fshb41.gallaudet.edu

Assistive Technology Funding and Systems Change - http://www.assisttech.com/atfsc.html

Rehabilitation Engineering Research Center on Adaptive Computers and Information Systems - http://trace.wisc.edu

Educational Resources Information Center (ERIC)

Access ERIC - http://aspensys3.aspensys.com/eric/ (also 1-800-LET-ERIC)

AskERIC - http://ericir.sunsite.syr.edu/

National Parent Information Network - http://ericps.ed.uiuc.edu/npin/npinhome.html

ERIC Clearinghouse on Assessment and Evaluation - http://ericae2.educ.cua.edu/

ERIC Clearinghouse on Elementary and Early Childhood - http://ericps.ed.uiuc.edu/

ERIC Clearinghouse on Information and Technology - gopher://ericir.syr.edu:70/11/clearinghouses/16 houses/CIT

ERIC Clearinghouse on Teaching and Teacher Education - http://www.ericsp.org/

ERIC Clearinghouse on Reading, English, and Communications - http://www.indiana.edu/~eric_rec

ERIC Clearinghouse on Science, Mathematics, and Environmental Science - http://www.ericse.org

ERIC Clearinghouse on Social Studies and Social Science Education - http://www.indiana.edu/~ssdc/eric-chess.html

ERIC Clearinghouse on Rural and Small Schools - http://www.ael.org/erichp.htm

ERIC Clearinghouse on Urban Education - http://eric-web.tc.columbia.edu

ERIC Clearinghouse on Disabilities and Gifted Education - http://www.cec.sped.org/ericec.htm

National Research and Development Centers

Center for Research on Cultural Diversity and Second Language - http://zzyx.ucsc.edu/Cntr/cntr.html

Center for Research on Educational Accountability and Teacher Evaluation (CREATE) - gopher://gopher.wmich.edu:70/11/wmu/evalcntr/CREATE

Center for Research on Evaluation, Standards, and Student Testing (CRESST) - http://www.cse.ucla.edu/CRESSThome.html

National Center on Adult Literacy - http://litserver.literacy.upenn.edu

National Research Center on Student Learning - http://www.lrdc.pitt.edu/

National Center for Research on Teacher Learning -
gopher://burrow.cl.msu.edu:70/11/Internet/msu/ncrtl

Other On-Line Resources

Education Associations and Organizations - http://www.ed.gov/EdRes/EdAssoc.html

The Electronic Newsstand (online periodicals) - http://www.enews.com

The Internet Public Library - http://ipl.sils.umich.edu

Web66 (Link to school home pages) - http://web66.coled.umn.edu

Search Tools

If there are resources you need that are not listed here, go to one of the following sites to use a keyword search to locate it.

InfoSeek - http://www.infoseek.com

Lycos - http://lycos.cs.cmu.edu

Yahoo - http://www.yahoo.com

Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge - June 1996

Bibliography

Aderluh, D.
"Schools Hook up to Net, Clinton." *Sacramento Bee*, March 10, 1996: B1.
Anderson, M.
"Technology: Today's Computer-Friendly Students Thrive on CD-ROMs and Interactive Learning, But the Hardware Bears a Hefty Price Tag." *The Tampa Tribune*. December 11, 1996:1.
Apple Computer, Inc.
Changing the Conversation About Teaching, Learning and Technology: A Report on Ten Years of ACOT Research. Cupertino, CA: 1995.
Bureau of the Census.
Statistical Abstract of the U.S., 1994. Washington, DC: Government Printing Office, 1994.
Braun, L.
Vision: TEST (Technologically Enriched Schools of Tomorrow), Final Report. Eugene, OR: International Society for Technology in Education, 1990.
CCA Consulting, Inc.
Understanding Information Technology in Kindergarten Through Grade 12. Wellesley, MA: 1995.
Center for Technology in Learning.
Year 2005: Using Technology To Build Communities of Understanding: A Report to the U.S Congressional Office of Technology Assessment. Menlo Park, CA: SRI International, November 1994.
The Children's Partnership.
America's Children and the Information Superhighway. Santa Monica, CA, and Washington, DC: September 1994.
Clements, D. H., & Wilmot, B.
"Reviewing and Viewing." *Teaching Children Mathematics*, 1(7), 456-457, 1995.
Cognition and Technology Group at Vanderbilt.
Enhancing Learning In At-Risk Students: Applications of Video Technology. Syracuse: ERIC Clearinghouse on Information Resources, 1989.
Collins, A.
"The Role of Computer Technology in Restructuring Schools." *Phi Delta Kappan*, 73(1), 28-36, 1991.
Committee for Economic Development.
Connecting Schools to a Changing World: A Technology Strategy for Improving Mathematics and Science Education. New York, NY: Committee for Economic Development, September 1995.
Council of Chief State School Officers.
U.S. Education and Instruction Through Telecommunications: Distance Learning for All Learners. Washington, DC: 1995.
Council on Competitiveness.
Breaking the Barriers to the National Information Infrastructure: A Conference Report. Washington, DC: December 1994.
Dwyer, D.
Apple Classrooms of Tomorrow: What We've Learned. *Educational Leadership*, 51(7), 4-10, 1994.
Education Development Center, Inc.

1993-94 Summary Report: Union City Interactive Multimedia Education Trial. New York, NY: 1995.

Education Turnkey Systems, Inc.
Marketing Guide for Title I. Falls Church, VA: 1995.

Federation of American Research Networks, Inc., and Consortium for School Networking.
Building Consensus/Building Models: A Networking Strategy for Change. Lexington, MA: Federation of American Research Networks, Inc., March 1994.

Fletcher, J.D.
Cost-Effectiveness of Interactive Courseware. Victoria, Canada: The Technical Cooperation Program, Technical Panel UTP-2, 1992.

Fletcher, J. D.
Does This Stuff Work? Some Findings From Applications of Technology to Education and Training. Paper presented at the Conference on Teacher Education and the Use of Technology-Based Learning Systems, Warrenton, VA: Society for Applied Learning Technology, 1995.

Fletcher, J.D.
The Effectiveness of Interactive Videodisc Instruction in Defense Training and Education (IDA Paper P-2372). Alexandria, VA: Institute for Defense Analyses, 1990.

Fletcher, J.D., Hawley, D.E., and Piele, P.K.
Costs, Effects, and Utility of Microcomputer-Assisted Instruction in the Classroom, 27, 783-806. American Educational Research Journal, 1990.

Glennan, T. K., and Melmed, A.
Fostering the Use of Educational Technology: Elements of a National Strategy. Washington, DC: The RAND Corporation, 1996.

Gordin, D., and Pea, R.D.
"Prospects for Scientific Visualization as an Educational Technology." *Journal of the Learning Sciences*, 4(3), 249-279, 1995.

Gore, A., and Brown, R.
The Global Information Infrastructure: Agenda for Cooperation. Washington, DC: U.S. Government Printing Office, January 1995.

Harvey, J. (ed).
The Market for Educational Software. Washington, DC: The RAND Corporation, May 1995.

Harvey, J. (ed).
Planning and Financing Education Technology. Washington, DC: The RAND Corporation, March 1995.

Harvey, J., and Purnell, S. (ed).
Technology and Teacher Professional Development. Washington, DC: The RAND Corporation, March 1995.

Hasselbring, T. S., et al.
An Evaluation of Specific Videodisc Courseware on Student Learning in a Rural School Environment. Knoxville, TN: Tennessee Valley Authority, 1991.

Hasselbring, T., Goin, L., Zhou, L., Alcantara, P., and Musil, S.
Cognitive Challenges and Pedagogical Opportunities of Integrated Media Systems. Albuquerque, NM: Presentation at International Conference, Technology and Media, Division of the Council for Exceptional Children, January 1992.

Hayes, J., and Bybee, D. L.
Toward Defining the Greatest Need for Educational Technology. Submitted as testimony to the Senate Appropriations Committee on Labor, Education and Health and Human Services, March 1995.

Herman, J.L.
The Faces of Meaning: What Do Teachers, Students, and Administrators Think Is Happening in ACOT. Los Angeles, CA: UCLA Center for the Study of Evaluation, 1988.

Honey, M., and Henriquez, A.

Telecommunications and K-12 Educators: Findings From a National Survey. New York, NY: Center for Technology in Education, Bank Street College of Education, 1993.

Information Infrastructure Task Force, Committee on Applications and Technology.
Putting the Information Infrastructure to Work: Report of the Information Infrastructure Task Force Committee on Applications and Technology. Washington, DC: U.S. Department of Commerce, May 1994.

Information Infrastructure Task Force, Committee on Applications and Technology.
The National Information Infrastructure: Reaching Society's Goals. Washington, DC: U.S. Department of Commerce, September 1994.

Intelliquest, Inc.
The National Computing Survey. Austin, TX: Microsoft/Intelliquest, April, 1995.

Interactive Educational Systems Design.
Report on the Effectiveness of Technology in Schools, 1990-1994. Washington, DC: Software Publishers Association, 1995.

Interactive Educational Systems Design.
Report on the Effectiveness of Technology in Schools, '95-'96. Washington, DC: Software Publishers Association, 1995.

Johnson, R.
Uses of Video Technology To Facilitate Children's Learning. Doctoral dissertation. Nashville, TN: Vanderbilt University, 1987.

Jones, B. F., Valdez, G., Nowakowski, J., and Rasmussen, C.
Designing Learning and Technology for Educational Reform. Oak Brook, IL: North Central Regional Educational Laboratory, 1994.

Jones, B. F.,Valdez, G., Nowakowski, J., and Rasmussen, C.
Plugging In: Choosing and Using Educational Technology. Washington, DC: Council for Educational Development and Research, 1995.

Keltner, B., and Ross, R.
The Cost of High Technology Schools. Washington, DC: The RAND Corporation, March 1995.

Kitchen, W.
"Education and Telecommunications: Partners in Progress." Testimony before the Senate Committee on Labor and Human Resources, March 11, 1987.

Kulik, C., and Kulik, J.
"Effectiveness of Computer-based Instruction: An Updated Analysis." *Computers in Human Behavior*, 7, 75-94, 1991.

Kulik, J. A.
"Meta-Analytical Studies of Findings on Computer-based Instruction," 9 33. In Eva L. Baker and Harold F. O'Neill, Jr., eds., *Technology Assessment in Education and Training*. Hillsdale, NJ: Lawrence Erlbaum Associates, 1994.

Kulik, J., Kulik, C., and Bangert-Drowns, R.L.
Effectiveness of Computer-based Education in Elementary Schools. *Computers in Human Behavior*, 1, 59-74, 1985.

McKinsey & Co.
Connecting K-12 Schools to the Information Superhighway. Palo Alto, CA: 1995.

McKnight, L., and Neil, S.
Connectivity and Interoperability for Education Through Information Infrastructure. Washington, DC: The RAND Corporation, March 1995.

Means, B., ed.
Technology and Education Reform: The Reality Behind the Promise. San Francisco, CA: Jossey-Bass, 1994.

Means, B., Blando, J., Olson, K., Middleton, T., Remz, A., and Zorfass, J.
Using Technology To Support Education Reform. Washington, DC: U.S. Department of Education, 1993.

Means, B., and Olson, K.
Technology's Role Within Constructivist Classrooms. Paper presented as part of a symposium, Teachers, Technology, and Authentic Tasks: Lessons From Within and Across Classrooms, at the annual meeting of the American Educational Research Association, San Francisco, CA: April 1995.

Means, B., and Olson, K.
Restructuring Schools With Technology: Challenges and Strategies. Menlo Park, CA: SRI International, November 1995.

Melmed, A.
A Learning Infrastructure for All Americans. Working Paper #93.6. Institute of Public Policy, Fairfax, VA: George Mason University, June 1993.

Merrill, D.
Evaluation of Educational Technology: What Do We Know, and What Can We Know. Washington, DC: The RAND Corporation, May 1995.

Middleton, T., and Means, B.
Exploring Technologies for the Education of Children With Disabilities. Menlo Park, CA: SRI International, 1991.

Moore, M. G., and Thompson, M. M.
The Effects of Distance Learning: A Summary of Literature. Southeastern Ohio Telecommunications Consortium, 1990.

National Center for Education Statistics.
Advanced Telecommunications in U.S. Public Schools, K-12. Washington, DC: U.S. Department of Education, February 1995.

National Center for Education Statistics.
Advanced Telecommunications in U.S. Public Elementary and Secondary Schools, 1995. Washington, DC: U.S. Department of Education, February 1996.

National Center for Education Statistics.
Digest of Education Statistics. Washington, DC: U.S. Department of Education, 1994.

National Center for Education Statistics.
Projection of Education Statistics to 2005. Washington, DC: U.S. Department of Education, 1995.

National Center for Education Statistics.
Schools and Staffing Survey, 1993-1994. Washington, DC: U.S. Department of Education, 1995.

National Commission on Excellence in Education.
A Nation at Risk: The Imperative for Education Reform. Washington, DC: U.S. Government Printing Office, April 1983.

National Coordinating Committee on Technology in Education and Training.
The National Information Infrastructure: Requirements for Education and Training. Alexandria, VA: March 1994.

National Council on Disabilities.
Study on Financing of Assistive Technology Devices and Services for Individuals With Disabilities: A Report to the President of the United States. Washington, DC: March 1995.

National Education Association.
National Education Association's Communications Survey: Report of Findings. Washington, DC: Author, June, 1993.

National Information Infrastructure Advisory Council.
Common Ground: Fundamental Principles for the National Information Infrastructure. Washington, DC: U.S. Department of Commerce, March 1995.

National Information Infrastructure Advisory Council.
KickStart Initiative: Connecting America's Communities to the Information Superhighway. Washington, DC: January 1996.

National Research Council.

Realizing the Information Future: The Internet and Beyond. Washington, D.C.: National Academy Press, 1994.

National Science and Technology Council.
A Strategic Planning Document for Meeting the 21st Century. Washington, DC: Committee on Education and Training, March 1995.

National Telecommunications and Information Administration.
Falling Through the Net: A Survey of the "Have-Nots" in Rural and Urban America. Washington, DC: July 1995.

Nelson, C. S., Watson, J. A., and Busch, J. C.
"The Interactive Videodisc as an Educational Tool." *Journal of Interactive Instruction Development*, 11-16, 1989.

Office of Educational Research and Improvement.
Using Technology To Support Education Reform. Washington, DC: U.S. Department of Education, September 1993.

Office of Educational Technology.
Making It Happen: Report of the Secretary's Conference on Educational Technology. Washington, DC: U.S. Department of Education, 1995.

Office of Technology Assessment, U.S. Congress.
Adult Literacy and New Technologies: Tools for a Lifetime. Washington, DC: U.S. Government Printing Office, 1994.

Office of Technology Assessment, U,S. Congress.
Teachers & Technology: Making the Connection. Washington, DC: U.S. Government Printing Office, 1995.

Perkins, D., Schwartz, J., West, M., and Wiske, M. (eds).
Software Goes to School: Teaching for Understanding With New Technologies. New York: Oxford University Press, 1995.

Pinellas County (FL) Public Schools.
Total Quality Schooling: A Plan To Empower a Community. August 1994.

Public Agenda Foundation.
Assignment Incomplete: The Unfinished Business of Education Reform. New York, NY: October 1995.

Quality Education Data, Inc.
District Administrators Report on the Effectiveness of Technology in the Nation's Schools. Stamford, CT: Curriculum Administrator, May 1995.

Quality Education Data, Inc.
Educational Technology Trends: QED's 8th Annual Sample Survey of Technology Use & Purchase Plans in U.S. Public Schools. Denver, CO: 1995.

Quality Education Data, Inc.
Networks Now, 1995: Survey of How States Use Telecommunication Networks in Education (Second ed.). Denver, CO: 1995.

Quality Education Data, Inc.
Technology in Public Schools, 1993-94: QED's 13th Annual Census Study of Public School Technology Use. Denver, CO: 1994.

Quality Education Data, Inc.
Technology in Public Schools, 1994-95: QED's 14th Annual Census Study of Public School Technology Use. Denver, CO: 1995.

Quality Education Data, Inc.
Technology in Public Schools, 1996: 15th Edition. Denver, CO: 1996.

Riel, M.
"The Impact of Computers in Classrooms." *Journals of Research on Computing in Education*, 22(2), 180-189, 1989.

Riel, M.
AT&T Learning Circle. Albuquerque, NM: Presentation at Symposium in Technology &

Social Interaction, International Conference, Technology and Media, Division of the Council for Exceptional Children, 1992.

Ringstaff, C., Sandholtz, J. H., and Dwyer, D. C.
Trading Places: When Teachers Utilize Student Expertise in Technology-intensive Classrooms. Cupertino, CA: Apple Computer, Inc., 1991.

Rockman, S., et al.
Assessing the Growth: The Buddy Project Evaluation, 1994-95. Final Report. San Francisco, CA: March 1995.

Rothstein, R.
Connecting K-12 Schools to the NII: A Preliminary Assessment of Technology Models and Their Associated Costs (working paper). Washington, DC: U.S. Department of Education, August 1994.

Ryan, A.
"Meta-analysis of Achievement Effects of Microcomputer Applications in Elementary Schools." *Educational Administration Quarterly*, 27(2), 161-184, 1991.

Schiller, E., Malouf, D., Hauser, J., and Fein, J.
"Technology and Children With Disabilities." *Enhancing the Integration of Children With Disabilities*. Baltimore, MD: Brooks Cole Publisher, forthcoming.

Secretary's Commission on Achieving Necessary Skills (SCANS).
Learning a Living. Washington, DC: U.S. Department of Labor, July 1992.

Secretary's Commission on Achieving Necessary Skills (SCANS).
What Work Requires of Schools: A SCANS Report for AMERICA 2000. Washington, DC: U.S. Department of Labor, June 1991.

Sheingold, K., and Hadley, M.
Accomplished Teachers: Integrating Computers Into Classroom Practice. New York: Bank Street College of Education, Center for Technology in Education, 1990.

Software Publishers Association.
Educational Content on the Big Wires: Partnerships Between Developers and the Cable and Telephone Industries. Washington, DC: 1994.

Software Publishers Association.
SPA K-12 Education Market Report. Washington, DC: July 1994.

Software Publishers Association.
SPA K-12 Education Market Report. Washington, DC: October 1995.

Southwest Educational Development Laboratory.
Networks for Goals 2000 Reform: Bringing the Internet to K-12 Schools, July 25-September 30, 1994. Austin, TX: 1995.

Stone-Martin, M., and Breeden, L., ed.
Fifty-one Reasons: How We Use the Internet and What It Says About the Information Superhighway. Lexington, MA: Federation of American Research Networks, 1994.

Telecommunications Industries Analysis Project.
Schools in Cyberspace: The Cost of Providing Broadband Services to Public Schools. Boston, MA: July 1995.

Tesler, L.
"Networked Computing in the 1990s." *Scientific American* (The Computer in the 21st Century: A Special Issue), 10-21, 1995.

U.S. General Accounting Office.
School Facilities: America's Schools Not Designed or Equipped for the 21st Century. Washington, DC: April 1995.

The Widmeyer Group, Inc.
Report on Technology and Education Focus Groups. Washington, DC: July 1995.

Wright, June L., and Shade, Daniel D., eds.
Young Children: Active Learners in a Technological Age. Washington, DC: National Association for the Education of Young Children, 1994.

Zorfass, J.
Evaluation of the Integration of Technology for Instructing Handicapped Children (Middle School Level): Final Report of Phase II. Newton, MA: Education Development Center, 1991.
Zorfass, J., Corley, P., and Remz, A.
"Helping Students With Disabilities Become Writers." *Educational Leadership*, 51(7), 62-66, 1994.

-###-